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MILITARY AFFAIRS

AVIATION AND COSMONAUTICS

No 4, April 1985

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Except where indicated otherwise in the table of contents the following is a complete translation of the Russian-language monthly journal AVIATSIYA I KOSMONAVTIKA published in Moscow.

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COSMONAUT LAUDS "PEACEFUL" NATURE OF SOVIET SPACE PROGRAM

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 5-7

[Article by twice Hero of the Soviet Union Pilot-Cosmonaut USSR Lt Gen Avn Vladimir Aleksandrovich Shatalov: "Following a Road of Peace and Progress"]

[Text] The final, concluding year of the 11th Five-Year Plan, which our country has entered, is unusual in many respects. It is the year of the 40th anniversary of Victory by the Soviet people in the Great Patriotic War, and of active preparations for the 27th CPSU Congress. As was noted at the most recent session of the USSR Supreme Soviet, it is called upon to make profound qualitative changes in societal production. The goal is to speed up intensification and boost the technological level of production, to achieve dynamic, proportional development of the economy and maximum utilization of production and scientific-technological potential as well as the economy's internal reserve potential.

Soviet citizens worked persistently to complete last year's plan successfully and to create a solid stockpile of achievement for a confident start to the final year of the five-year plan. We have also made substantial achievements in the conquest of space. The successes of the Soviet space program concentrate as at a focal point the steadily growing might of the socialist economy, the rapid advance of Soviet science, and the growing proficiency of engineer-technician and worker cadres.

It is correctly stated that the space program is one of the key sectors of the broad front of the search and quest effort by Soviet scientists, who are developing tomorrow's hardware.

Space research has prompted the creation of new branches of science and technology and has stimulated the development of existing branches. The space program is opening up new worlds for mankind and is helping in the preparation of weather forecast maps and in achieving rapid communications between continents. Today a great deal has been accomplished through the labor of the Soviet people. Communications, navigation, and meteorological support systems have been reliably operating for quite some time now. Development of the means and methods of obtaining information from space about the Earth and its

natural resources is proceeding in full swing. Soviet crews are standing watch in space on an almost continuous basis.

Representatives of the socialist countries, a citizen of the French Republic, and a citizen of the Republic of India have flown on board Soviet spacecraft and space stations. Cosmonauts have made an incalculable contribution to the cause of strengthening peace and friendship between peoples. Ten years ago, in July 1975, a handshake between the crews on board the first Soyuz-Apollo orbital complex symbolized cooperation in space and on Earth between people of different countries. A considerable contribution toward the accomplishment of this experiment was also made by the people at the Cosmonaut Training Center imeni Yu. A. Gagarin.

Considerable changes have taken place at the Center in its 25 years. Training facilities have changed. Complex combined simulators, a weightlessness simulation tank, a planetarium, and new flying laboratories have been added. Cosmonaut training center equipment and facilities are growing. Electronic computers are making increasingly more powerful inroads into the training process. They simulate the external environment, system operations, and situations which may arise in space. The Cosmonaut Training Center continues to be the unique organization it was during the first years of its development.

Activities are in full swing in the classroom and laboratory buildings and at the sports complex at Zvezdnyy Gorodok [Star City]. There are specialists engaged in training cosmonauts, while others are performing important experiments. The conquerors of the universe are gaining experience and knowledge prior to new Soviet space launches and are building upon the traditions which have been passed down to them.

In past years ties have broadened between the Cosmonaut Training Center and scientific organizations, USSR Academy of Sciences institutes, various ministries and agencies in whose interests space research and exploration are being conducted today. This promotes implementation of the manned space exploration program in the interests of science, technology and the nation's economy. Since the famous flight by Yuriy Gagarin, an additional 57 Soviet cosmonauts have been in space. Vladimir Dzhanibekov flew four missions, 12 cosmonauts have flown three missions, and 12 others have flown two missions. A total of 69 persons have flown on board Soviet spacecraft. Valeriy Ryumin logged a total of 8,685 hours in space. And each new mission was distinguished by greater complexity of program and was of greater duration. Man's penetration into space became a powerful factor in accelerating scientific and technological advance.

The 237-day manned mission by mission commander Leonid Kizim, flight engineer Vladimir Solov'yev, and cosmonaut-researcher Oleg At'kov, the longest in the history of space exploration, was a major event in the space program. Possessing enormous scientific-technological, economic and international-political significance, it confirmed the growing capabilities of orbital complexes for the conduct of orderly and systematic research both in the basic sciences and for practical purposes. This mission constituted weighty evidence of the correctness and effectiveness of the path we had selected in

advancing the space program. It demonstrated the reliability and excellent quality of Soviet space hardware, the talent of its designers and builders, and skilled utilization of this hardware by cosmonauts.

The space program in the United States is proceeding along a different path. As is reported in the foreign press, the U.S. Department of Defense has let out to arms manufacturers an initial 10 contracts connected with implementing a program to deploy a large-scale anti-ballistic-missile defense system with elements of space basing. The Pentagon is aching to get into space. Contrary to "peace-seeking" statements, the present U.S. Administration is undertaking new steps toward militarization of space. Peaceful research is being cut back in the interests of implementation of purely military programs. For example, the launch in January of this year of the space shuttle "Discovery" pursued purely military aims.

The Soviet space program is of a peaceful nature and serves the interests of mankind. As a result of successful accomplishment of the longest manned mission in the history of space exploration, for example, a worthy contribution was made toward achieving the targets of the 11th Five-Year Plan, specified by the 26th CPSU Congress, pertaining to further study and exploitation of space.

Extended missions lay down the foundation for future strides by mankind in the conquest of space for peaceful purposes, for the sake of advance by civilization. The need for extended missions is dictated by an expanded research program and by an increased number of experiments in the interests of various branches and sectors of the economy. Accomplishment of such large, comprehensive programs requires that crews remain for a longer period of time in Earth orbit. We shall continue endeavoring to increase the information content volume of research activities, more extensively employ automated and nonautomatic systems, in order as efficiently as possible to utilize space for peaceful purposes, for the benefit of man.

With each new mission, scientists and specialists amass knowledge on the response of the human organism to factors of space flight and develop the most effective methods and means of maintaining the crews of orbital space stations at a high level of work efficiency. Specialists and the cosmonauts themselves presently believe that missions lasting up to a year are entirely practicable and should not cause any dangerous complications in the human organism. Unquestionably each new step should be taken with caution, taking into account the psychophysiological peculiarities of crew members, and training and preparation of the cosmonaut's organism for a manned mission and return to Earth should be improved.

Specialists performed thorough study and investigation of the state of health of Leonid Kizim, Vladimir Solov'yev, and Oleg At'kov, both during the flight and during the period of ground readaptation. Only changes typical of all extended missions were noted. This fact indicates the correctness of the path chosen by specialists in planning ground training and preparation, in drawing up an optimal work and rest program and regimen, and in ensuring continuous monitoring of the state of the organism. Cardiologist At'kov performed examination of the cosmonauts at a high professional level. This helped

ensure greater reliability of knowledge on the state of health of the crew members during the mission. We should also note the well-conceived schedule for cosmonaut rest following the return from space, which made it possible to accelerate the cosmonauts' readaptation to terrestrial conditions.

The third resident crew was visited at the space station by two additional crews of visiting cosmonauts. The first of these was an international crew consisting of Yuriy Malyshev, Gennadiy Strekalov, and Rakesh Sharma, citizen of the Republic of India, which successfully performed geophysical, technological, and medical experiments. Incidentally, Soviet-Indian cooperation in space research dates back two decades. Our country gave India technical assistance in designing and building India's first scientific satellite, which was lifted into orbit by a Soviet rocket booster. Research was conducted in the area of beyond-atmosphere astronomy, observations were conducted of artificial Earth satellites, and lunar soil was studied. The mission flown by a Soviet-Indian crew once again demonstrated the Soviet Union's aspirations toward utilization of space for peaceful purposes.

The second visiting crew -- Vladimir Dzhanibekov, Svetlana Savitskaya, and Igor' Volk -- also successfully accomplished its work program. Dzhanibekov and Savitskaya, conducting an EVA, performed difficult tasks involving cutting, welding, and soldering/brazing metal specimens and applying coatings with the aid of general-purpose hand tools.

Leonid Kizim and Vladimir Solov'yev performed six spacewalks, with a total of 22 hours and 50 minutes of EVA. They performed difficult and multistage work operations. They installed bypass lines into the backup main fuel lines of the unified propulsion unit. The cosmonauts were assisted by specialists at the Training Center, who performed the same operations in parallel while submerged in the weightlessness simulation tank. Special tools, fixtures, and process documentation were delivered to the orbital space station.

A sixth EVA was required in order to enlarge the solar battery panel. A similar operation had previously been performed by Vladimir Lyakhov and Aleksandr Aleksandrov. They had required two EVAs to accomplish the task. The amassed experience enabled Kizim and Solov'yev to complete the job in a single EVA. The result was increased power generating capabilities of the station's solar batteries, essential for the performance of power-intensive tasks. In addition, Kizim and Solov'yev performed another important operation: they cut out from the panel a square containing four solar cells. This will enable scientists and design engineers to analyze the aging of solar panels in conditions of space.

We should like to emphasize that the job done by the third resident crew on board the Salyut 7 space station was a notable event not only due to the duration of the mission. The crew displayed staying power and courage and demonstrated a high degree of skill in performing many operations, including operations performed in space for the first time, and in carrying out a large-volume program of scientific research. Success was promoted by extensive training and preparation on the ground, both in a professional and psychological regard. This resulted in crew members getting along well with one another and achieving smooth, harmonious work activities throughout the

entire mission. It is important to study this experience and take it into consideration in training and preparing cosmonauts for extended missions.

The cosmonauts performed more than 500 experiments. Each of these required the observance of time intervals and rigorous orientation of the orbital space station complex. Some experiments and investigations were performed simultaneously in parallel in order to increase efficiency of labor. The work schedule was constructed according to the block principle, that is, investigations in each area of inquiry were conducted over the span of relatively long time segments (a week, and sometimes even two weeks). This enabled the cosmonauts to go deep into the essence of an experiment, analyze obtained results, and make adjustments. This was precisely the procedure they followed in performing experiments on the Isparitel' [Evaporator], Tavriya [Taurida], Elektrotopograf [Electrotopographer], as well as geological investigations.

The Tavriya experiment consisted essentially in producing various preparations, in conditions of weightlessness, for use in medicine, agriculture, and other sectors of the economy. The quality of the produced materials was very high. Suffice it to say that, in the estimate of specialists, they are 10-20 times as pure as materials produced on Earth. This is of enormous significance for medicine.

All extended manned missions on the Salyut 7 space station once again confirmed the effectiveness of visual observations. The advantages of studying the Earth from the vantage point of a space station are dictated first and foremost by a unique feature of the station's flight. A cosmonaut can cover with a single glance an area totaling 10-12 million square kilometers. With the Salyut's axis of rotation oriented toward the center of the Earth, 360 degree observation (through the six viewing ports in the transfer module) of the surface of our planet is possible, to a distance of up to 2,000-2,500 kilometers.

The crew led by Leonid Kizim discovered and recorded various geologic structures and features which showed promise for mineral prospecting. This enabled geologists to save time and resources, sending exploration parties into the most promising areas. Cosmonauts studied the behavior and biological resources of the ocean and its influence on weather. They performed tasks for several hundred organizations which use space-obtained data in their scientific and production activities.

As was noted, the crew performed a large volume of repair activities. In connection with this it would seem that there is a need to make radical changes in the principles of designing spacecraft. Provision of redundancy of component elements is one method use to increase a system's reliability. The fact is that if an individual component fails, a backup component cuts in, and the entire device continues operating. But there are also negative aspects to this, however. The weight and cost of an item increase. It is therefore advisable to focus on increasing an item's repairability (this is the term used to apply to its suitability for preventing, finding, and correcting malfunctions in the course of servicing and maintenance). Experience indicates that in some cases it is much cheaper to replace modular units and

lines than to back them up with redundant units. At the present time almost all orbital space station systems can be repaired by this method during a mission. There are practically no systems which could not be restored to service by crew members during a mission.

The Interkosmos program was adopted in 1967. In a short period of time scientists and specialists from the program's participating nations succeeded in accomplishing a great deal. With the aid of Soviet satellites and research rockets, they accomplished large-scale joint projects in the area of study of the physical properties of space, space meteorology, communications, biology and medicine, and Earth resources. They have made a substantial contribution to space science and utilization of space program achievements for applied purposes.

Joint missions by cosmonauts from the socialist countries opened up a new page in the history of the space program. They became an example of successful cooperation by the brother countries in implementing socialist integration and testimony to their steadily growing convergence. In space affairs as well socialism is faithful to its root principles, where it considers cooperation, mutual assistance, and internationalism to be of paramount importance.

This is the peaceful directional thrust of our program of space exploitation, in contrast to the U.S. program, which is of a pronounced militarist character. Soviet cosmonauts look to the future with optimism. They are convinced that the forces of peace are capable of gaining the upper hand. They believe in the sober nature of the human intellect. Space should be peaceful. The space program will then become a mighty instrument enabling us to develop our economy more rapidly.

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LENIN'S FOSTERING OF SOVIET AVIATION DOCUMENTED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 8-9

[Article, published under the heading "115th Anniversary of V. I. Lenin's Birth," by Hero of the Soviet Union Candidate of Military Sciences Maj Gen Avn L. Shishov: "For Aviation to Grow and Strengthen"]

[Text] Everything connected with the name of Vladimir Il'ich Lenin is infinitely precious to Soviet citizens. Aviation personnel study with great concentration our leader's military legacy pertaining to the development of aviation: articles, orders, instructions, telegrams, notes, and other documents. We prize the memoirs of old Bolsheviks, military figures, and older-generation Soviet aviators. Of considerable interest to each and every one of us are the numerous letters, reports, and briefing summaries on the organizational development of Soviet aviation and the aircraft industry.

A 12-volume biographical chronicle has just been completed and published, entitled "Vladimir Il'ich Lenin. Biograficheskaya Khronika" [Vladimir Il'ich Lenin, A Biographical Chronicle]. It traces Lenin's entire life and career year by year, month by month, and frequently even hour by hour. All facts which have been brought to light as a result of many years of investigation of archival materials, the press, memoir literature and numerous other sources have been collected and classified for the first time on such a scale. This fundamental work contains a great many facts connected with aviation issues.

Publication of selected writings of V. I. Lenin have also commenced: Lenin's fundamental writings, as well as his last articles and letters, will be presented in 10 volumes. The 40th Lenin Sbornik [Collected Volume] is being readied for publication, containing a large number of various documents and materials attesting to V. I. Lenin's truly titanic activities and to his alertness toward problems the resolution of which determined the establishment and development of the Soviet Air Force.

At the beginning of the century, when there was a skeptical attitude toward airplane and balloon flying, which was viewed as an amusement or entertaining sport, Vladimir Il'ich foresaw a great future for this outstanding achievement of man's genius. Back in 1914 he characterized the 20th century as the century of "airplanes, electricity, and automobiles."

When World War I erupted, he drew attention time and again to the importance of employing aircraft for military purposes. In his "Krakh II Internatsionala" [Collapse of the Second International], for example, Vladimir Il'ich stresses the role of aviation as a means of reconnaissance and target designation.

V. I. Lenin returned to Russia in April 1917 and, as we know, came forth with the famous April Theses, which played an enormous role in Bolshevization of the old army, including aviation units. During the October Revolution the overwhelming majority of aviation detachments went over to the side of Soviet rule. Many pilots, as A. Mozhayev, Ye. Akhmatovich, V. Ochkin and others later recollected, took direct part in the October Armed Uprising and performed missions assigned to them by V. I. Lenin and the Military Revolutionary Committee.

From the very first days of Soviet rule Vladimir Il'ich took resolute measures directed toward establishment and development of a material and technological foundation for aviation. In December 1917, for example, considering a petition requesting additional advances of funds to the Anatra Aircraft Plant in Odessa, he issued a resolution demanding that things be sped up.

A decree of the Council of People's Commissars dated 28 June 1918, signed by V. I. Lenin, nationalized all large-scale industry, including aircraft enterprises. On 4 July of that same year V. I. Lenin directed the State Control Commission to issue an advance of 200,000 rubles to the Moscow Aerotechnical Plant. A decree dated 11 July ratified the general schedule of government revenues and expenditures of the Russian Republic for the period January-June 1918, including an allocation of approximately 8 million rubles for maintaining Red Army aviation and 45 million rubles for emergency expenditures by the People's Commissariat for Military and Naval Affairs and Glavvozdukhoflot, caused by the military situation.

A decree issued by the Labor and Defense Council dated 16 June 1920 gave aircraft enterprises equal status with the key group of defense plants as regards supplying with fuel, raw materials, and semimanufactures. In October of that same year V. I. Lenin signed a Council of People's Commissars decree ordering above-estimate credit of approximately 387 million rubles to be issued to the War Industry Council for organizational and production expenditures of the Main Directorate of the Association of Aircraft Plants.

The question of organization of the aircraft industry was specially examined at a meeting of the Labor and Defense Council on 5 January 1921. The official minutes of this meeting were signed by V. I. Lenin.

Alongside establishment of a material and technological foundation for aviation, scientific centers and educational institutions were organized in this country, and new airfields and test facilities were built. The Central Aerohydrodynamics Institute (TsAGI) was established in December 1918, becoming the center for development of Soviet aviation science and technology. Vladimir Il'ich personally scrutinized the staff of this institute, as is indicated by a note he made to this effect. The question of granting special authorities to the People's Commissariat for Military Affairs in the

organization of aircraft engineering was discussed at a meeting of the Small Council of People's Commissars in August 1920. A request from the Main Directorate of the Workers' and Peasants' Red Air Force for the allocation of 25 million rubles for building experimental aircraft was considered at that same meeting.

In September 1920 the Council of People's Commissars issued a decree signed by V. I. Lenin allocating funds for the construction of airfields in Saratov, Kirsanov, and Rzhev. At that same time an Air Forces scientific-experimental airfield was being built for the purpose of conducting test activities and special experiments.

Various schools and short courses of training, including aviation, which trained commanders and political workers, engineers and technicians, were organized on the instructions of V. I. Lenin. Vladimir Il'ich maintained communications with educational institutions and d' 'ayed constant concern for them. He met with pilot cadets at the Moscow .viation School and gave assistance in improving their diet, in boosting gasoline allocations and in settling other problems.

During the entire Civil War V. I. Lenin kept an eye on the activities of aviation units, aviation personnel, commanders, and political workers, assisted them and inquired about their doings. This is attested by numerous Lenin documents and reminiscences of aviators on meetings with the leader.

In the Central Party Archives of the CPSU Central Committee Institute of Marxism-Leninism there are preserved two notes by V. I. Lenin directed to the People's Commissariat for Military Affairs in March-April 1918. Vladimir Il'ich requested fast and precise execution of a request by Finnish Red Guard leader E. Rakh'ya that his aviation detachment be sent fuel, spare parts and equipment for their aircraft, as well as navigation charts. The 5th Socialist Aviation Detachment under the command of Red Military Pilot F. Romanchuk operated as an element of Soviet forces fighting the Finnish White Guard in Karelia.

When VLadimir Il'ich learned that a British squadron had steamed into the White Sea, he telephoned instructions to the Republic Revolutionary Military Council that aircraft be dispatched northward. We also know that V. I. Lenin directed the Supreme Military Council on 9 August 1918 to beef up troops in the Arkhangelsk area, and to send airplanes and bombs there. V. Bonch-Bruyevich, military supervisor of the Supreme Military Council, soon reported to Lenin that his orders had been carried out.

Aggressive combat actions by Soviet aviation against domestic counterrevolution took place in the Tsaritsyn area in the summer and fall of 1918. An aviation group arrived there at the beginning of August on V. I. Lenin's instructions. The pilots repulsed air attacks by British and White Guard aircraft, flew strikes against ground troops, and conducted aerial reconnaissance.

In the summer of 1919, during the offensive by the Eastern Front's Southern Group of Forces against Kolchak's forces, White Cossack and kulak rebellions

broke out in a number of areas in the Urals. In telegrams to the Revolutionary Military Council of the Eastern Front dated 11 and 18 July, V. I. Lenin pointed to the necessity of employing airplanes against the rebels.

In August the situation on the Southern Front worsened in connection with the fact that a horse cavalry corps under the command of White Guard General Mamontov penetrated to the rear of Soviet forces. Devising measures to combat the enemy cavalry, on 4 September V. I. Lenin wrote a note to E. Sklyanskiy, in which he instructed the latter to employ aircraft, pointing out that "cavalry is powerless against a low-flying airplane." A special aviation group was immediately formed of the best pilots at the Moscow Aviation School, headed by the school's commanding officer, Yu. Bratolyubov; the group was soon attacking Mamontov's cavalry.

When the forces of bourgeois-landowner Poland attacked the Soviet Ukraine in 1920, and Vrangel commenced an offensive toward the Donbass from the Crimea, a large number of aviation detachments were dispatched to combat the White Poles and Vrangel forces. Soviet pilots conducted aerial reconnaissance, fought aggressive air engagements, and hit ground targets on the battlefield and deep behind enemy lines.

V. I. Lenin instructed that aircraft be used to disseminate special and propaganda materials behind enemy lines. On 3 August 1920 he sent a note to the Revolutionary Military Council of the Western Front: "It is essential to take all measures to disseminate as widely as possible in Poland the manifesto of the Polish Revolutionary Committee. Our aircraft shall be utilized for this purpose. Report back on what has been accomplished." Several days later he ordered a 10-fold intensification of agitation by aircraft, in an effort to explain to the Polish workers and peasants that "their capitalists are thwarting peace and are condemning them to pointless bloodshed."

When the struggle against Vrangel took on decisive significance, V. I. Lenin stated in a telegram to I. V. Stalin dated 2 August 1920: "...The Vrangel danger is becoming immense.... I have arranged with the Commander in Chief for him to give you more ammunition, reinforcements, and airplanes."

Vladimir Il'ich attached considerable attention to the forming and utilization of aviation in the interests of the nation's economy and to organization of international air routes. As early as 1918 a "Special Applications Department" was set up under the auspices of the Main Directorate of the Workers' and Peasants' Red Air Force. Its duties included aerial photography for determining land boundaries, maintaining a record of land and forest tracts, correction of existing and creation of new maps, as well as performance of other tasks for peaceful purposes.

A Council of People's Commissars decree on air transport operations was signed on 17 January 1921, for the purpose of regulating flights over the Soviet Republic. This document defined the conditions of and regulations for flight operations, flight procedures for foreign aircraft, and the responsibility of officials and flight personnel in organizing flight operations. On 8 September of that same year V. I. Lenin signed a Council of People's Commissars decree on establishment of air service between Moscow and Germany.

In 1921-1922 the Soviet Government issued a number of decrees calling for an extensive program of aircraft construction. Allocations were increased for scientific research and design activities, and facilities were improved. Particular importance was attached to training cadres capable of strengthening aviation units and innovatively developing aviation sciences and technology.

Guided by the decision of the 10th Party Congress and V. I. Lenin's instructions on strengthening the defense capability of the Soviet nation, the Russian Communist Party (of Bolsheviks) Central Committee Plenum ordered the following in a decree on strengthening the Red Army: that the War Ministry be allocated 35 million rubles in gold for the further development of aviation. The matter of distribution of funds for military needs was discussed repeatedly in the fall of 1922 at meetings of the RCP(b) Central Committee with the participation of V. I. Lenin. In November Vladimir Il'ich dictated a letter to I. V. Stalin dealing with the allocation of considerable funds for the development of aviation.

Subsequent Council of People's Commissars decrees also attest to the tireless concern on the part of V. I. Lenin, the party Central Committee and the Soviet Government for the all-out strengthening of aviation. Eleven volumes of decrees by the Soviet authorities have been published to date. Several decrees and orders deal with establishment and development of the Air Forces and civil aviation.

Soviet aviation personnel, working to master the Lenin legacy of military theory, are faithfully carrying out the instructions of our great leader pertaining to strengthening the defense capability of the socialist state. Striding toward the 27th CPSU Congress, they are demonstrating total devotion to the Communist Party, the Soviet people, and the behests of the great Lenin.

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SOVIET WORLD WAR II FIGHTER TACTICS REVIEWED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 10-11

[Article, published under the heading "War Heroes -- Air-Force Tactics," by Hero of the Soviet Union Honored Military Pilot USSR Col Gen Avn G. Dol'nikov: "Soviet Fighters in Battles for the Homeland"; part one of a two-part article]

[Text] During the Great Patriotic War fighter tactics experienced greater changes than those of the other air components of Frontal Aviation. This is due to the fact that the aircraft fleet became completely replaced and upgraded in the course of combat operations, weapon capabilities increased, and more sophisticated communications equipment, radar surveillance of airspace, and tactical control systems came into operation. The qualitative and quantitative growth and improvement of equipment, amassing of combat experience and increased proficiency of flying personnel substantially affected all the basic elements of tactics: modes of conduct of air combat, offensive and defensive tactics, combat formations, organization of teamwork and coordination, as well as methods of preparing and readying aircrews for a combat sortie.

On the eve of the war frontal fighter aviation [fighter aircraft controlled by a front] comprised 53.4 percent of total Air Forces aircraft. It was a well-established air component, tasked with downing enemy aircraft in air-to-air combat. Aircraft included the Yak-1, LaGG-3, MiG-3, I-16, I-153, and I-15bis. Only 25 percent of the total, however, were aircraft of new types -- YaK-1, LaGG-3 and MiG-3. Most units were flying I-15bis, I-16, and I-153 aircraft, which were inferior in performance characteristics to the fascists' Messerschmitts. In aerial combat during the first period of the war Soviet pilots countered the enemy's qualitative superiority with high morale and mass heroism. In their tactics they sought to find and utilize every possibility of providing friendly ground troops with more reliable cover against air attacks and to inflict maximum damage on the adversary.

Inadequate offensive potential, which is provided by aircraft speed and high rate of climb, dictated the conduct of defensive fighting. The good maneuverability, tight turn radius and fast rate of level turn of the I-153 and I-16 also determined tactics which were based on turning combat. To put it in modern terms, a Messerschmitt controlled distance in combat with a

"chayka" [gull] or "ishachok" [donkey], that is, having a margin of speed, a pilot could, at his own discretion, close with or separate from a Soviet aircraft. To prevent the adversary from making a high-speed attack, our pilots employed a group maneuver -- a closed circle.

In a circle each following aircraft would cover the rear hemisphere of the aircraft flying ahead, preventing the adversary from approaching to open-fire range. Attack capabilities proper, however, were restricted by the very scheme of the maneuver, since a friendly aircraft was out front. A closed circle hindered attack from the same altitude, but when a Messerschmitt proceeded to maneuver vertically, exploiting its superior rate of climb, the defense proved more vulnerable. Thus turning combat was a forced tactical device and failed to express the fighter's basic principle -- offensive aggressiveness.

Nevertheless during the first period of the war Soviet pilots added a remarkable page to the history of aviation. While inferior to the enemy in quantity and quality of aircraft as well as in experience in air combat, our fighters shifted from defensive to offensive tactics. Thanks to the highest degree of patriotism, courage, skill and innovation, they inflicted appreciable losses on the enemy. A sharply increased combat aggressiveness was reflected in the employment of frontal attacks, aerial ramming, as well as in an endeavor to down enemy bombers on a priority basis, inasmuch as the latter presented the greatest threat to the defended troops.

An enormous role in a frontal attack was played by a pilot's tenacity, composure and strong nerves. A combat pilot would close on the adversary head-on to the closest possible distance. When the latter was unable to withstand the psychological stress and would turn away, the Soviet pilot would undertake a vigorous maneuver and would immediately proceed to deliver aimed fire. In addition to moral fortitude, a high degree of weapon proficiency was necessary in this situation -- the ability to deliver aimed fire in virtually any aircraft spatial position. Skillful maneuver was to be combined with accurate fire.

A great deal has been written about ramming in military literature. Intrepid pilots employed this device when there was no other option. A typical situation was running out of ammunition. In such a situation a combat pilot would deliberately attempt to collide with his adversary. He would attack the enemy aircraft's control surfaces and cables with his spinning propeller, and the enemy would go down. Frequently this was the last action our combat pilots took. But brave individuals would deliberately seek to ram and inflict irreparable loss on the enemy at the cost of their own life.

Air combat against a bomber had specific features. In order correctly to organize an attack it was necessary to be familiar with the bomber's vulnerable points, the "blind" spots in its zone of defensive fire. But the main thing was to penetrate the fighter cover which usually protected an enemy attacking bomber force. It was necessary to have several varied tactics ready to use, one of which would be selected -- the most advisable in the prevailing situation. Innovativeness and search for new tactics were coming into their own. Here is how one air engagement in the first period of the war

developed, in which Hero of the Soviet Union fighter pilot V. Golubev took place.

A wing of Ju-87 and Me-109 aircraft, proceeding in four groups, crossed the line of contact at dusk near Shlisselburg and took up a heading toward the Koredzhskiy Port. Our pilots knew that Junkers flew bombing runs off a leader. But five aircraft were clearly too few against such an armada. And the flight leader gave the command to attack the group lead aircraft on a head-on course. Golubev took the one closest to the target warships, while fighter pairs Baysultanov-Petrov and Kozhanov-Tsyganov headed for two other lead aircraft. The outcome was settled within seconds. The lead aircraft of all three enemy groups plunged to the ground near the warships.

The five fighters attacked the other group in practically the same manner and immediately downed an additional two Ju-87s. The enemy formation broke up, and the intrepid pilots attacked once again from below and shot down two more Junkers. Success was achieved thanks to the novelty of the tactics -- head-on attacks on lead aircraft in bomber groups, which were difficult to repulse. The guardsmen's high degree of weapon and flying proficiency, their boldness and courage in battle and, of course, their ability to take a calculated risk were additional factors in the fighters' successful efforts.

Analysis of air engagements fought by Soviet pilots in December 1941, January and February 1942 indicated that it was necessary emphatically to increase pilot proficiency, beginning with their training and preparation on the ground. It was necessary to move away from dense combat formations in the air and from defensive engagements in a circle and to improve utilization of airborne and ground radio gear, constantly and continuously to study the air and ground adversary and his frequently changing tactics, and to work persistently to master new combat devices.

One of the first steps in development of fighter tactics in the initial period of the war was employment of composite combat formations which included aircraft of different types. The idea was to increase the effectiveness of group actions and to make up for the deficiencies of one aircraft with the advantages of another. MiG-3 fighters would take their altitude and usually attack from a dive. The slower but more maneuverable I-16s would proceed at a lower altitude, from which they would prevent Messerschmitt attacks, dislodging them from under the tails of the MiG-3s.

Yak-1 aircraft were not inferior to the Messerschmitts in their combat performance characteristics, but they were few in numbers in Air Forces units at the beginning of the war. At altitudes above 3,000 meters they had a speed advantage, were equal in rate of climb, and were superior in horizontal maneuver. The 1942 fighter tactics manual recommended that the adversary be drawn to a disadvantageous altitude by stacking the Yak-1 formation, in which the lower group would engage, while the covering group would continuously vertically attack the adversary. A shift to horizontal maneuvering immediately following the first attack was considered a gross error. An altitude advantage achieved at the beginning should be utilized very economically. The combat results achieved by Soviet fighters in that terrible

year 1941 indicate that in spite of the extremely difficult conditions, our pilots downed 8,372 enemy aircraft in air engagements.

Hitlerite fighters employed two variations in providing protective cover to their strike aircraft. In the first variation fighters would be sent out in advance into the designated target area; these fighters would engage our patrols and draw them out of the protective coverage area by the arrival of the bombers. In the second variation, enemy fighters would proceed to the target together with the bombers, protecting them en route and in the target area.

After our ground and air forces became more aggressively active, the fascists began employing so-called double-cover tactics. Screening fighters comprised one of the groups. They would patrol in the vicinity of the target in the direction of probable approach by Soviet aircraft and would have the mission of preventing penetration through to the German bombers. Another group, the immediate cover group, comprised the second line of defense and was tasked with fighting off attacks by Soviet fighters which had broken through. During short-duration offensive actions, running 1-2 hours, the screen group would total 20-30 aircraft, while running 6-8 aircraft in the case of systematic offensive actions lasting several days. They would patrol in the strike area, would accept combat upon the appearance of Soviet aircraft, and would immediately radio for reinforcements. Following the first attack pass the Messerschmitts would usually pull up into a vertical climb and maneuver for another pass following breakaway.

The prevailing situation in the air demanded that the enemy's tactics be countered with our own tactics, enabling us in conditions of quantitative inequality to engage enemy bombers successfully. In an attempt at straight-line penetration, our fighters would encounter the screen and would be forced to engage fighters. A maneuver involving bypassing the screen was then devised. The combat formation was split into an attack group and a containing or blocking group [gruppa skovyvaniya]. The latter would move into the area of the defended installation 3-5 minutes earlier and would divert to itself the enemy's screen, thus ensuring unhindered penetration by the attack group through to the enemy bombers.

Division of the combat formation into groups of differing tactical function involved improving organization of command and control as well as the need to plan group air combat, in the dynamics of which fighter flights or pairs performed dissimilar functions but operated according to a common plan. The first changes pertained to primary organization of the combat formation: our fighters relinquished the three-aircraft flight and adopted the four-aircraft flight consisting of two pairs. It became crowded even for the pair, however, in a close formation.

New aircraft -- the La-5 and Yak-3 -- entered combat service in 1942. Military aviation was becoming qualitatively stronger. The I-16 had a speed of 490 km/h, could climb to 5,000 meters in 6 minutes, and was armed primarily with machineguns, while the La-5 had a speed of 650 km/h could climb to an altitude of 5,000 meters in 4.7 minutes, and was armed with two 20 mm cannons. An expanded range of speed capabilities, improved acceleration performance,

and more potent fire dictated the necessity of opening up the combat formation. High-speed maneuver required greater space in which it was executed.

That same year fighter aircraft began to be equipped with radios (prior to that time one or two aircraft in a squadron carried transceivers). This immediately affected tactics, primarily as regards command, control, and coordination.

The 16th Air Army at Stalingrad, for example, organized a fighter command and control system based on radio nets of different functions (taking into account the experience of the 8th Air Army in the fighting at Leningrad). Command post, division and regimental commanders, visual guidance stations and airborne group leaders operated on a common frequency. Radio-equipped visual observation posts were deployed along the battle line in such a manner as to observe all adjacent airspace.

Commanders and forward air controllers sent up to the line of contact were able to estimate the air situation, to help their fighters gain a clear understanding of it, and to make correct decisions. They would report back to the command post, warn and vector fighters, and call in reinforcements. Mar Avn S. Rudenko, commanding general of the 16th Air Army, writes: "While at the command post I had the occasion to command airborne fighters and ground-attack aircraft. I would be continuously receiving situation data and reports. I could hear the combat and sense the dynamics of tactical control. We felt much more confident. Our system rapidly became firmly established, gained recognition, and withstood the test of combat. On the basis of our acquired experience, we put together the Air Forces' first manual on tactical control of fighters by radio."

Direction of combat from the ground did not inhibit the initiative of the group commanders in the air. The main advantage of a forward post lay in the fact that a much larger zone came under its observation and, when the enemy appeared, his location and strength would be communicated to the fighters. A command to execute a maneuver would be given only in case of a suddenly and unexpectedly occurring threat. Radio exchange during vectoring would continue up to the moment the adversary was spotted. Also effective was a variation where a fighter reserve group would be at the post's disposal, which would be engaged if the situation required and would settle the outcome of battle.

Dispersion of the aircraft formation and distribution of different tactical functions between groups had an immediate effect on the combat results of our fighters, aggressiveness on the part of which was combined with military artifice. One of the variations of engagement commenced with attack by the best fighter pairs on groups of Messerschmitts patrolling over the battlefield. The adversary, accustomed to encountering large and close-packed groups, would immediately radio for assistance. Upon discovering only a two-ship element, however, he would immediately rush to the attack, giving no thought to reinforcement. Suddenly a second, previously unnoticed pair would swoop down from above, having received target designation by radio. Enemy attempts to build up combat efforts would be blocked by "hot" reserve fighters receiving command information by radio.

Fighters fought for air supremacy for the most part in air-to-air engagements. For example, the pilots of the regiment under the command of Hero of the Soviet Union Gds Lt Col L. Shestakov were assigned the task of proving that the fascists could be successfully fought with our new Soviet aircraft. But for this it was necessary to ensure altitude superiority. On training sorties pilots worked to master advanced flying technique and honed their piloting abilities so as to ensure that a pilot possessed altitude superiority after executing maneuvers. And we soon saw that an Me-109 pilot "would not fight" if he found himself at a lower altitude. Our guardsmen downed 60 fascist aircraft in a single month of combat operations.

Success was fostered by three basic factors. The first was stacking of the aircraft formation, with altitude intervals of 500 to 1,000 meters between tiers. This made it possible not to lose visual contact and coordination between pairs. The second factor was formation of a group line abreast during the search phase, with spacings up to 200 meters between aircraft. With this formation the enemy was unable to attack with the element of surprise: each pilot had excellent visual coverage of his partner's rear hemisphere. The third factor was change in combat tactics proper: each pair not engaged by the enemy would endeavor to gain altitude, flying straight into the sun, and to attack from above, taking the enemy by surprise.

Over the course of one and a half years of war we succeeded in gaining back from the aerial adversary our superiority in tactics. This directly affected the results of fighter combat activities. According to 1942 combat results, the ratio of losses in air-to-air engagements was 1:2.5 (2.5 enemy aircraft were downed to 1 downed Soviet fighter). Appreciable losses were inflicted on the enemy, while the aggressiveness of our fearless fighter pilots was steadily growing. (To be concluded)

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HELICOPTER PILOT'S EXPLOITS IN AFGHANISTAN DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 14-16

[Article, published under the heading "They Were Decorated by the Homeland," by Col Ye. Besschetnov: "Takeoff Roll"]

[Text] Communist Party member and Military Pilot 1st Class Maj A. Surtsukov flew hundreds of missions while rendering internationalist assistance to the working people of Afghanistan as a member of the limited contingent of Soviet forces in that country, missions which demanded of him extreme exertion of moral and physical energy. Serving as a deputy commander and commander of a helicopter squadron, he gave his subordinates an example of boldness, courage, and self-sacrifice. This officer's military labor was honored by several government decorations, including the highest decoration -- the Order of Lenin. Anatoliy Vasil'yevich is presently enrolled at the Red-Banner Order of Kutuzov Air Force Academy imeni Yu. A. Gagarin. The following article tells about this officer's experience in the military and about his performance of military and internationalist duty.

Anatoliy VAsil'yevich was invited to a Komsomol conference at the academy. When it ended, the activists asked him to stay a bit. Gathering in a separate room, they proceeded to ask him questions about his tour of duty in Afghanistan and to solicit his opinion on issues of concern to them. The question of today's youth came up. One of the Komsomol organization secretaries complained that some young people conscripted into the military have been spoiled by excessive parental attention and sometimes lack emotional maturity and a sense of responsibility.

"It is true that one encounters such individuals, but they are in the minority," Major Surtsukov rejoined. "I have seen our boys in action in Afghanistan, and I have seen how difficult things sometimes are for them. I cannot recall a single instance, however, where anybody faltered, drew back, lost his composure, or displayed cowardice. And yet these were not specially selected individuals. They are just like everybody else. I shall state quite

frankly that we have every reason to be proud of our young people and their faithfulness to duty and to the interests of the Soviet Union...."

As I listened to Anatoliy Vasil'yevich, a thought came to me: "He himself can be rightfully considered one those about whom he is speaking with such conviction!" Surtsukov was born after the Great Patriotic War and entered the military somewhat more than 10 years ago. He is truly a representative of the new, postwar generation. And he embodies so much appealing intellectual and spiritual integrity, moral purity and maturity! My admiration was aroused by what I heard about the feats of this officer from his former commander and fellow soldiers. And when I became more closely acquainted with him and his military deeds, I became convinced that there was not a single grain of exaggeration in the statements of praise I had heard about Surtsukov.

His service in the military is akin in some ways to the takeoff roll of his favorite helicopter, the Mi-8, taking off like a fixed-wing aircraft -- a short but powerful and swift takeoff roll. He has not served long in the military, and yet his experience has been filled with events, with a swift climb to the heights of military fame.

Anatoliy dreamed about aviation way back in secondary school. Upon completing his 10-year schooling, he went to work at the Saratov Aircraft Plant, at the same time making application to the local flying club. While mastering the job of benchworker-mechanic at the plant, he was also studying helicopters, the fundamentals of flying helicopters and aerodynamics at the flying club. His mentor was Vasiliy Antoshkin, an experienced instructor and genuine enthusiast about his job. It is he who must be credited for the fact that Anatoliy soloed in June 1971, and as the first one in his group!

This was a victory which was quite determining in the youth's future. During his compulsory military service Anatoliy furthered his knowledge of helicopter equipment, and upon discharge into the reserves he returned to his civilian job and continued his flying club activities. Subsequently completing an inactive duty training session, he submitted an application for volunteer enlistment in active military service, and in the fall of that year, with the rank of junior lieutenant, he left to report for duty at an aviation unit in the Red-Banner Far East Military District.

In this line unit Anatoliy worked confidently on mastering combat skills. He also enjoyed increasing reputation and respect in his outfit. Soon Surtsukov had risen from copilot navigator of an Mi-8 helicopter to squadron deputy commander. His lightning reaction speed, his ability, as they say, to evaluate a situation in the wink of an eye and to reach the only correct decision, saved him time and again in critical situations.

...Low cloud cover hung over the coniform hills, blanketed in coniferous forest. Having completed a cross-country flight, the crew led by Surtsukov was flying in clouds, heading toward their home field. The aircrew kept remembering the warning of possible deteriorating weather. It seems that the weather forecaster had been right: the cockpit glass was icing up.

"She's icing up, skipper!" flight technician Sr Lt Ivan Smykov reported, with alarm in his voice.

"So I see!" Surtsukov nodded toward the panel, indicating that he had already switched on the deicing system and, descending, broke out of the overcast.

Taiga stretched below them, but due ahead they could see a light-colored patch, a mar' -- a swampy area thickly strewn with tall hummocks. Surtsukov made every effort to correct the situation, but he realized that things looked like he would have to make a forced landing. Of course it was hazardous to put down at that point: the helicopter might be flipped over by a hummock as it attempted to land. But there was no other option. Anatoliy proceeded to descend. The manual contained no description of a method to put down onto a mar', and therefore, relying on his own pilot's sense, he selected the proper power setting, and gave a quick power burst with collective-pitch and throttle just before touchdown. The helicopter, touching hummock tops with its wheels, dipped into a broad clear area, rolled forward about 10 meters or so, and came to a halt. This was what you would call a precision landing!

"What should we do, skipper?" Sr Lt Arkadiy Cheremisov, the copilot-navigator, looked over expectantly at Surtsukov.

"I don't think there is any point in waiting to be rescued; this spot could not be reached by vehicle or on foot," Anatoliy replied. "The only thing we can do is get out of here on our own."

He radioed his decision to the flight operations officer. The three of them then set to work. They carefully inspected one of the engines and discussed how to get it back operating. When they fired it up, it functioned normally. There was just one question: how would it do under load? They checked the other engine -- it seemed to be working perfectly well.

At this point the regimental commander arrived by air. They weighed all the pros and cons and decided to try to fly out of there. The helicopter cautiously rose above the swamp and proceeded low across the tops of the spruces, picking up airspeed....

When they arrived at the field and taxied to the ramp, everybody not occupied with urgent matters ran over to the helicopter. There was good reason! They were concerned: had the helicopter not overturned during its landing into the swamp? And yet they had managed to make it home w'thout the assistance of specialist personnel. Of course the bulk of the credit went to the aircraft commander. It was he who had correctly assessed the situation and realized what had to be done. Anatoliy Surtsukov's actions were rewarded with a Medal for Distinguished Military Service.

Yes, Major Surtsukov arrived in Afghanistan an experienced, proficient first-class combat pilot. And when the need arose to perform a most difficult, important mission, the squadron commander frequently would send him up, fully confident that he would handle the task in the best possible way.

Once it was necessary to haul out of a remote village in one of the provinces seven local activists who were under a death threat from bands of mercenaries which had managed to infiltrate into the area. Surtsukov's crew flew this mission.

It seemed that the aircrew had figured out every last detail. But when they arrived at the village, situated high in the mountains, they saw that it would be rather difficult to land the helicopter. Finding a more or less suitable spot, they landed. The aircraft commander personally supervised the boarding. Fifteen or so Afghans and their personal belongings filled up the cargo space. The helicopter was obviously overloaded, and the air was thin at this elevation. How could they take off in those conditions? Surtsukov, relying on his expertise, commenced taking off. When they finally lifted off and the helicopter slowly but steadily began picking up airspeed, they felt a surge of relief. Now things would go easier....

"I still see as if it were just yesterday that village, tightly clinging to the mountainslope, and excited people impatiently clambering into the cargo space," Anatoliy Vasil'yevich recalled. "I remember well a gray-haired old gentleman whom I helped climb up the steps into the helicopter, and I remember women filled with anxiety for the fate of their children. In short, we piled on board as many people as we could, and we somehow managed to get it into the air. And when we arrived back at the field, the Afghans were really grateful! I saw a great deal during my tour of duty in that country, and every time a critical situation arose, we would cheer ourselves with the thought that, carrying out our internationalist duty, we were doing an important and noble job. This infused us with energy, firmness of spirit, courage and helped us surmount difficulties."

Maj A. Surtsukov's crew, as others in Afghanistan, had occasion to deliver food, clothing, shoes, and fuel to the population and to carry out sick and injured. They flew not only by day but at night as well, time and again putting their helicopter down into high-mountain landing sites of limited size.

Naturally it was difficult, but our aviators were willing to take the risk. And it was not only the difficulty of the flight proper -- the enemies of the April Revolution made every effort to take vengeance against those who, following their internationalist duty, had come to the aid of the working people of Afghanistan. At every opportunity they would attempt to inflict damage, plant mines, and fire at helicopters from ambush. Time and time again Major Surtsukov had occasion to rescue fellow soldiers from trouble.

...Capt Fedor Stepanovich's helicopter, while flying above mountain terrain, came under fire from a camouflaged and concealed dushman [bandit] antiaircraft gun. The aircraft commander reported the situation back to his command post, and a pair of search-and-rescue helicopters, led by Major Surtsukov, was immediately dispatched from a field strip. "Fedya, what's happening?" Anatoliy Vasil'yevich said to himself with alarm, heading for the designated area. "If only you and your crew have survived."

The downed helicopter was lying deep in a canyon. Instructing Sr Lt Yuriy Naumov, his wingman, to cover him, the lead helicopter, from the air, Surtsukov proceeded to descend. There was virtually no place to put down. They somehow managed to land on a narrow terrace not far from the crippled helicopter. While the specialists from the airborne team brought by the rescue helicopter, taking shelter behind projecting rocks, advanced toward the crippled helicopter, Surtsukov, his copilot-navigator Sr Lt Boris Shevchenko, and flight technician Sr Lt Aleksandr Zhukov tried to spot the familiar light-blue flying suits worn by the helicopter crew, but to no avail. At this time the dushman proceeded to deliver fire from behind cover. If it were not for Naumov's aircrew, all of them would have been in a real predicament.

The exchange of fire did not last more than half an hour, but nevertheless they had not been able to extract everybody from the downed helicopter. But they could not linger any longer: they were running out of fuel.

"We returned to the airfield and landed," Anatoliy Vasil'yevich related. "Our CO drives up to the helicopter and asks: 'Well, what's the story?' I reported how things stood: we had extracted some of them, while others were still at the crash site. 'We've got to get every last man out of there,' the commanding officer said. 'Who shall we send?' It was not easy to come up with an answer. There is a certain psychological element here. When you first go out on a mission, you do not sense the actual danger and are guided solely by your sense of duty. In order to go out a second time one must force oneself, surmounting an inner obstacle. I could vouch for myself, but how could I make a decision for the others? On the other hand, if I took along not them, who had already tasted fire, but a crew unfamiliar with the situation, things might take a turn for the worse. I glanced over at Naumov and his copilot-navigator, Lt Sasha Sasarov. Both of them nodded, indicating their consent to go back. The CO said to me: 'Anatoliy, if it would be a hardship, tell me. I'll understand.' I replied: 'I am familiar with the situation. We'll put it down and do the job.' 'Fine,' the commanding officer assented. 'But put on body armor....'"

The crews assembled and headed out. And they completed the job.

The situation in which aircrews had to operate toughened and unified the men. With each mission the air warriors matured, became stronger-willed, and honed their skills. And this was so important!

Considerable trouble was being caused at the time by bands making their way, across the border into the Charikar "green zone" via the Panjsher Gorge. This was a very important infiltration route for the counterrevolutionaries, via which mercenaries would spread out all over the country. It was important to interdict use of this corridor. When the valley was cleared of bandits as a result of an operation conducted by subunits of the Afghan Army, Afghan Army posts took up position on the cliffs above the road leading into the Panjsher Valley, to observe traffic entering and exiting from the gorge.

"Anybody who has not seen those rock cliffs," said Anatoliy Vasil'yevich, "can scarcely grasp how impregnable they are. It is extremely difficult to climb them, and some cannot be scaled period. The posts could be manned only via

helicopter. And of course helicopters delivered to the posts all requisite supplies for performing their assigned mission."

...That day his crew had to work harder than ever before: assisting their comrades in arms, they made several landings and takeoffs under dushman fire. They were exhausted. Then suddenly a radio message came in from one of the clifftop posts: "Whoever is out there, please pass on this message. We are urgently in need of help!"

The post was situated on a mountaintop soaring 3,000 meters above sea level. It had the appearance of a knife blade. One side was a 1,500 meter sheer drop; the other slope, although not a sheer cliff, was still rather steep. In addition, a strong wind was blowing. And winds in the mountains are treacherous! How could he put down on this "knife blade"? Surtsukov asked the post soldier in command to put up some smoke and, using the smoke as a reference point, proceeded to land his helicopter.

As soon as he began his approach, he sensed that the wind was drifting the helicopter laterally. His copilot-navigator read off aloud rpm and altitude, while he fought the drift, continuing his descent. He slowed as much as possible, applied maximum power, and at this speed proceeded to approach the rocky projections. Suddenly what he had feared came to pass: he had no more power available, when a powerful gust of wind, rounding the peak, suddenly proceeded to drag the helicopter onto the slope. There was insufficient clear space to move either right or left, and he had no power left to climb.... The situation was critical. If he faltered, lost courage, or manipulated the controls incorrectly, he would careen downward into the abyss. But Major Surtsukov commanded to himself: "Freeze!" He did not lose his self-control or composure. And as if in reward for this, a gust of wind struck the helicopter from below, lifting it several meters. Do it! The pilot reduced collective pitch and settled the helicopter onto the projecting rock.

When the flight technician looked out from the cargo space, he could not believe his eyes: the helicopter hung suspended over a sheer drop; only the nose wheel and right main gear wheel were resting on the projecting rock. The pilot was balancing on these two points of support, using his brakes and engine rpm. (The members of the other crew, who were observing the landing, later said: "We watched while the helicopter grasped the edge of the cliff like a bird and held on.") In the meantime fuel was running low. Anatoliy Vasil'yevich urged the others: "Faster, fellows, get moving." Finally the loading was completed. It was time to take off.... Surtsukov plunged the helicopter into the abyss, picked up airspeed as he dropped, and headed for home.

When the most difficult part of the mission was behind them, flight technician Sr Lt Anatoliy Larin glanced over at the pilot and said: "That is what I call skill! I have been in the service more than 10 years now, and I have never before seen such a landing or takeoff."

This praise was spoken by a man of considerable experience.

In time Maj A. Surtsukov was placed in command of a helicopter squadron and on many occasions led groups on important missions. Sometimes the situation was such that people's lives depended on his decision. He always chose the optimal alternative, which ensured both safety and exemplary performance of the assigned mission. This officer devoted much time and energy to training his men and increasing their flying proficiency and military skills. He was given inestimable help in his work by Capt Anatoliy Korshunov, appointed his deputy commander, Sr Lt Boris Shevchenko, head of navigation service, and Sr Lt Nikolay Rachitskiy, who had proven to be a growing, capable political worker. Many of the squadron's aviators were awarded coveted government decorations. The Order of the Red Banner and Order of Lenin were added to Major Surtsukov's Distinguished Service Medal.

An important role in Anatoliy Vasil'yevich's destiny was played by his father, Vasiliy Fedorovich, a party member from 1944. At the front he served as a loader on a 122 mm howitzer crew, and subsequently as a gun commander. He was in Berlin when the war ended. He worked at the Saratov Aircraft Plant for a quarter of a century. He did not talk much, but when he did talk, his words made a deep impression. His older son Viktor, a music conservatory graduate (he teaches in the department of folk instruments at the Institute of Arts in Frunze), and his younger son Anatoliy owe him a great deal.

"He was a rock," Anatoliy Vasil'yevich says of his father. "He was powerful, sinewy. He did not get beyond the fifth grade, but he knew so much.... He taught himself, accomplishing everything with his own intellect. He kept a constant eye on my development. He was abrupt at times, but he taught me to live correctly and in a worthy manner. And I will always be grateful to him for that."

Bidding Anatoliy farewell as he was leaving for the military, Vasiliy Fedorovich instructed him: "Serve with honor, son. Don't jump out ahead of the others, but if you have been entrusted with a job, do it right. And if it should come to that, be willing to give your life for the sake of performing your duty. Leave with others a good memory of yourself."

Vasiliy Fedorovich died when Anatoliy was a lieutenant, but the lesson for life he had taught him has remained forever with the younger Surtsukov. Here too, in Afghanistan, when taking off on a mission, Anatoliy Vasil'yevich repeatedly remembered his father's instructions about his duty to others and about serving honorably. How his father today would be pleased at his success!

...He has completed his takeoff roll. Major Surtsukov is continuing his long flight, as it were, from the vantage point of which the horizon recedes, opening up broad prospects which promise new outstanding accomplishments in a noble cause -- faithful service to the homeland.

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YOUNG FIGHTER PILOTS DOWN TARGET DRONE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 16-17

[Article, published under the heading "Into Competition," by Military Pilot 1st Class Col A. Andryushkov: "Worthy of Talalikhin"]

[Text] The jagged shoreline passed under the combat aircraft's wing. Military pilot 2nd Class Vitaliy Loginov shifted his gaze to the instrument panel. He read on the integrated display: target on heading. Range to target....

The target was being controlled by an experienced operator. His task consisted in thwarting the fighter pilot's attack and making the latter fight the air-to-air engagement on his own terms.

Loginov was in no hurry to switch on the sight. He knew that it could trigger the "adversary's" attack warning system. He recalled the squadron commander's parting words prior to his departure: "The formula of combat today is initiative plus the element of surprise."

Three years ago Senior Lieutenant Loginov reported for duty to the line unit. The higher school for pilots in Armavir had trained its students for line-officer flying, but upon reporting for duty in the line regiment it was necessary once again to study descriptions and manuals: the equipment was a level of sophistication higher, and the knowledge he had gained in school was patently insufficient. Vitaliy had plenty of desire, however, to fly, to view the sweep of the horizon from the vantage point of the stratosphere, and to take on the "adversary" in air combat.

The young pilots flew their first training flights... on the ground. "In order not to confuse in the air the firing button with another switch," Lt Col V. Sviridov told them, "it is necessary to hone one's actions on the flight simulator to a state of automatism."

It was now clear to Loginov that it was no easier to "fly" a simulator than a missile-armed combat aircraft and that there was much to be gained from simulator training. "Consider 10 'flights' in the classroom the equivalent of one actual flight," the veteran pilots told the lieutenants. And indeed, when

the young pilots shifted their training to the airfield, everybody qualified in the minimum number of hours. They saved enough fuel to supply a squadron flight operations shift. In addition, by "flying" in the simulator, they became convinced that it is impossible to become a genuine combat pilot without seeking new combat techniques, without independence or initiative.

...The sun was blindingly bright, as if desiring to make it hard for the pilots to spot the targets. Sunbeams played across the cockpit canopy, reflecting off the faces of the instruments. Loginov lowered his tinted face mask. The cockpit interior took on a light-blue hue. "It's like in the sea in shallow water," Vitaliy thought to himself. He could clearly read the dial faces and indicator needles. The triangular pointers of the automatic guidance equipment came to life and displaced to the right. The pilot made a heading adjustment with a light movement of the control stick: "Target on heading...."

Loginov gave a thought of gratitude to those who had readied his combat aircraft. Automatic systems, engine, and controls were working perfectly.

"Wing 45!" the officer reported to the command post.

Altering the angle of wing sweep, the aircraft was taking on the appearance of a giant arrow fired by a taut bowstring. The point of the arrow was aimed toward the attack lead point. The target should appear there, many kilometers from the fighter. "Get it with your first missile," he could still hear the squadron commander's instructions. "There will be no time for a second attack pass. Take your time...."

...It had happened during preparations for a tactical air exercise. The squadron commander had scheduled for Loginov a target intercept sortie. Target altitude was at the aircraft's service ceiling.

Loginov's "adversary" was the squadron commander. Military Pilot 1st Class Lt Col Vladimir Arsent'yevich Sviridov made use of every opportunity personally to test the skill of his pilots. The young pilots would prepare thoroughly for combat with their commanding officer. And happy was he who following a training sortie heard from Sviridov a short: "Attaboy!" The squadron commander is sparing with praise, but if he does praise a pilot, the pilot deserves it. The fairness and correctness of his words are unquestionable. Sviridov notes officers' endeavor to equal the performance of the outstanding individuals. And he is pleased that the aviators do not hold things back from one another but generously share their acquired experience and know-how and are quite willing to answer questions. The squadron commander teaches his men not to be shy about asking questions.

"A pilot's most dangerous enemy is false embarrassment, the fear of appearing weak in the eyes of others. All of you," he would say to the younger men, "know how to fly, but there is no limit to improvement, and you should constantly seek to attain the heights. This means you must work."

Vladimir Arsent'yevich cannot tolerate idleness. During flight operations at the field, upon climbing out of the cockpit of his combat aircraft he proceeds

to help the ground maintenance technician ready the aircraft, while in the classroom he is the first to get in the flight simulator.

The lieutenants marvel at their commanding officer and emulate him in all things. And they endeavor first and foremost to be like him in their flying. They recall how last year Lieutenant Colonel Sviridov took them to the unit's combat glory museum, stopped in front of one of the display stands, and said to them, pointing to a row of photographs: "You want to fly like they flew!"

The photographs contained veterans of the regiment who had been awarded combat decorations and medals: Honored Military Pilot USSR Col A. Savel'yev, military pilots and expert marksmen A. Akitis, B. Yuferev, Ye. Kunitsyn, E. Manzhela, and Hero of the Soviet Union Jr Lt Viktor Vasil'yevich Talalikhin, who was just as young as they themselves.

...On 10 May 1941 Major Korolev and battalion commissar Khadyrev proceeded to form a fighter regiment at an airfield outside Moscow. Its nucleus consisted of pilots and aircraft maintenance specialists who had taken part in the fighting against the White Finns. They included Jr Lt Viktor Talalikhin. The young pilots gazed with respect at the Order of the Red Star on the flight commander's chest. Although the same age as they, he had already gone through trial by fire. Viktor said to his fellow soldiers at that time: "We must prepare to defend the homeland...."

Three months later the country learned about this intrepid pilot's feat. Defending the skies over Moscow against fascist bomber attack, Viktor Talalikhin rammed one of them which, under cover of darkness, was about to drop its lethal cargo onto the capital.

By order of the minister of the USSR Armed Forces, Hero of the Soviet Union Viktor Talalikhin was permanently entered on the rolls of the fighter regiment. "The personal fearlessness and heroism displayed by Comrade Talalikhin," the order read, "should serve as an example of valor and heroism for all Soviet Army personnel.

"We were shown a documentary film," one of the pilots related. "You know, Talalikhin's appeal vigilantly to guard the homeland's skies sounded like it was directed personally to me. I looked at my comrades: they were standing at attention as if swearing an oath...."

Taking off on the eve of the exercise to intercept a high-altitude target, Loginov knew that combat with the squadron commander would not be easy. Vitaliy commenced climbout, accelerating his fighter beyond Mach 1.5. He was still quite some distance from the target, but the desire to see the "adversary" as quickly as possible was pressing him. And the young pilot made a mistake: he vigorously pulled back on the control stick. The altimeter needle proceeded to race around the dial face. Up, up, up.... He had almost reached the designated altitude, and the "adversary" could already be seen on his radar sight, when the pilot noticed a sharp decrease in speed. The laws of aerodynamics were imposing their will. The pilot had been in too much of a hurry, resulting in a failed intercept.

"What if it had been the real enemy?" the squadron commander asked Loginov at the time.

...And now he was about to live-fire on a real target. The pilot once again ran his gaze over the instruments from left to right, as he had been taught. Everything was normal. He checked the airspace outside the cockpit: the sky was empty.

"Sight!" an automatic signal flashed on. A toggle switch clicked. The "adversary" appeared on the screen as a radar blip. The operator of the radio-controlled target was an instant late with his command. Loginov felt the surface of the firing button through his leather glove.

A missile surged forward from under his left wing. A scarlet tongue of flame cut through the blue of the sky and headed toward the target, which had commenced an evasive maneuver. Too late! Loginov radioed to the ground: "Missile away! Disengaging!"

"15," the tactical control officer confirmed, "target downed. Congratulations!"

"Thanks!" the pilot replied.

Although Loginov did not actually say so, the command post team correctly understood that the fighter pilot was sharing his victory with those who had ushered him out on his mission.

A minute later Vitaliy heard Sr Lt F. Mikhaylov initiate his attack. His friend's clear, ringing voice reported the news that he too had scored a hit.

The two of them entered the control tower together. "Comrade lieutenant colonel," the officers saluted in unison, but before they could blurt out a report, the squadron commander stopped them, hugged one, and then the other, and said: "Attaboy! Real fighter pilots!"

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AIR FORCES PART IN BERLIN OPERATION DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) p 18-19

[Article by Mar Avn G. Skorikov: "The Air Forces in the Berlin Operation"]

[Text] In April 1945 Soviet troops reached the approaches to the capital of Hitlerite Germany, Berlin, bulwark of the sinister forces of fascism and that country's administrative and military-industrial center. The hour of Victory was drawing nigh.

In spite of the total political isolation and sapped economic resources of the fascist state, the Wehrmacht command authorities had established a powerful defense disposed in depth on the eastern front. Forces in the field included 214 divisions totaling 1 million men, 10,400 guns and mortars, and 1,500 tanks, self-propelled guns and assault guns. Air forces supporting the enemy's ground troops included the 6th Air Force and Air Force Reich, which included air defense aviation assets of the Berlin zone. There were a total of 3,300 aircraft, 70 percent of which were fighters. The Luftwaffe was armed with Ju-88 and Ju-87 bombers, Me-109 and FW-190 fighters of various modifications, reconnaissance and artillery spotter aircraft, as well as Me-163 and Me-262b jet fighters (120 aircraft). Flying personnel for the most part were combat-experienced and highly proficient.

In addition, a well-developed airfield network (40 airfields) and a comparatively small tactical area of operations (350 x 150 km) enabled the Hitlerite command authorities to shift air efforts from one sector to another. The airspace over Berlin was defended by antiaircraft artillery totaling 600 guns.

The plan for the Berlin Operation approved by Hq SHC [Headquarters, Supreme High Command] called for the forces of the First Belorussian (MSU G. K. Zhukovskiy, commanding), Second Belorussian (MSU K. K. Rokossovskiy, commanding), and First Ukrainian (MSU I. S. Konev, commanding) fronts to defeat the Berlin force in detail and to compel fascist Germany to accept unconditional surrender.

The forces of our three fronts totaled 2.5 million men, 41,600 guns and mortars, 6,250 tanks, self-propelled guns and assault guns. Troop combat

operations were supported by the 4th Air Army (Col Gen Avn K. A. Vershinin, commanding) of the Second Belorussian Front, the 16th Air Army (Col Gen Avn S. I. Rudenko, commanding) of the First Belorussian Front, and the 2nd Air Army (Col Gen Avn S. A. Krasovskiy, commanding) of the First Ukrainian Front. The 18th Air Army (Chief Mar Avn A. Ye. Golovanov, commanding) was enlisted to the operation. The forces of the air armies totaled 7,500 combat aircraft (2.3 times as many as the adversary possessed). New Tu-2, Il-10, La-7, Yak-3, and Yak-9 aircraft comprised one third of the total. Flying personnel possessed a wealth of combat experience, high morale, and were well trained and prepared.

The command authorities stockpiled sufficient supplies of ammunition, fuel and lubricants in anticipation of intensive air combat operations.

According to the plan of operation, Soviet air forces were to maintain firm air supremacy, provide reliable air cover and support to ground troops during penetration of the enemy's defense, support insertion of tank large strategic formations and combined units into the gap and support their actions at operational depth, hit approaching enemy reserves, and continuously conduct air reconnaissance.

Special attention was devoted to assisting troops in crossing the Oder, Neisse, and Spree rivers.

Proceeding from the general plan of operations, air-force headquarters staffs drew up tactical plans. These were supplemented by preparation of diagrams of targets, coded maps, and combat sortie schedules. Each air army's aircraft combat employment plans had their own specific features, dictated by the prevailing situation and the unique nature of the decisions of the commanding generals of the fronts.

In preparing aviation units and combined units for the operation, considerable attention was devoted to organization of command and control. A centralized system of radar guidance centers was set up in the 16th Air Army, for example: two corps centers and one army center. Particular attention was focused on organization of teamwork and cooperation with ground troops. The headquarters staffs of large strategic formations and combined units drew up coordination plans, in which specific missions for ground troops and air forces were defined. The commanders of combined-arms and tank large units established personal contact with aviation commanders and coordinated all matters pertaining to joint operations. Flying personnel toured the forward edge of the battle area, became acquainted with the situation, and subsequently toured the operations area by air. Coordination between aircraft, tank armies and artillery, as well as between frontal and long-range aviation combined units was worked out in particular detail. Targets and time of strike delivery were determined by the front commanders in whose zone the air actions were prescribed.

During the period of preparation for the operation, intensive party-political work was conducted in the line units, aimed at instilling strong morale and aggressive enthusiasm in the men as well as instilling faith in the approaching victory. Unprecedentedly high spirits prevailed among Soviet

servicemen. Thousands of officers and enlisted men were accepted to party membership just prior to commencement of the offensive.

Reconnaissance aircraft were assigned a particular mission in the Berlin Operation. They revealed the character of the enemy's defensive fortifications, his force grouping, availability of reserves, aircraft basing and numerical strength. The Soviet command authorities received intelligence in a prompt and timely manner on the situation in the tactical area of operations.

The troops of the First Belorussian Front shifted to the offensive on 16 April 1945, a few hours before dawn. Night bombers of the 16th Air Army and a portion of the forces of the 4th Air Army, flying PO-2 aircraft, took part in air preparation for the assault phase. Bombers delivered concentrated strikes on strongpoints, weapons, headquarters and communications centers in the enemy's first and second defensive zones.

The night bomber strikes in the zone of advance of the forces of the First Belorussian Front were intensified by four aviation corps of the 18th Air Army. 745 Soviet bombers delivered a massive strike on the Letschin, Langsow, Werbig, Selow, Friedersdorf, and Dolgelin strongpoints. Every minute 18 aircraft passed over the targets. The density of the bombing attack amounted to 50 tons per square kilometer of target area.

The air combined units formations consisted of support echelons and a strike echelon, as well as observation groups. The support echelon included weather reconnaissance aircraft, guidance and target illumination aircraft. The guidance aircraft marked the bombing run initiation point with parachute flares, while illumination aircraft illuminated the targets with larger parachute flares. The strike echelon contained three-four columns of altitude-stacked single aircraft. This echelon was followed by the aircraft of the combined unit commander or deputy commander, which observed bombing results. Three chaff-carrying aircraft were assigned to the formation of each regiment for the purpose of jamming enemy radars.

After dawn broke, ground-attack aircraft proceeded to provide air support to the advancing troops. Due to the bad weather, they operated in small groups. Bombers directed their principal efforts against enemy reserves.

The enemy resisted tenaciously. Fighting to break through the tactical zone of defense threatened to drag on. The 1st and 2nd Guards Tank armies committed to battle. In spite of the poor weather, the aircraft of the 16th Air Army continued steadily hitting enemy targets to a depth of 10-12 kilometers. In the course of each hour from 250 to 660 aircraft were in the air over enemy positions. By evening on 19 April the enemy's third zone of defense was broken through with active air support, and Soviet forces commenced a maneuver to encircle and split up the Berlin force grouping. During this period of time the aircraft of the 16th Air Army flew 14,700 sorties. A total of 474 enemy aircraft were downed in aerial combat.

The troops of the First Ukrainian Front, which shifted to the offensive on the morning of 16 April, were supported by aircraft of the 2nd Air Army. Bombers

flew a massive strike (668 aircraft) which lasted more than 2 hours. When the 3rd and 4th Guards Tank armies committed to battle, the main forces of the 2nd Air Army were directed to support tank crews and provide air cover to the troops which were crossing the Spree. Two ground-attack, 2 bomber, and 2 fighter corps helped the tanks advance swiftly and successfully operate separated from the troops by a distance of from 30 to 90 km. In 3 days of fighting the aircraft of the 2nd Air Army flew 7,517 sorties and downed 158 enemy aircraft in air-to-air combat.

The air actions of the 4th Air Army were heavily marked by the fact that the troops of the Second Belorussian Front began the offensive by crossing two branches of the Oder. Due to considerable distance from the forward edge of the battle area, artillery was unable to reach the entire depth of the enemy's tactical defense. Therefore the task of neutralizing and destroying centers of resistance in this zone was assigned chiefly to ground-attack aircraft.

Initially the bulk of the forces of the 4th Air Army supported the 70th and 49th armies. But with offensive exploitation in the zone of advance of the 65th army, the commanding general of the Second Belorussian Front decided to concentrate air efforts on supporting its troops. Thanks to centralized command and control, within 30 minutes the main forces of the 4th Air Army were retasked with performing this newly-arisen mission.

Air power was also aggressively enlisted to repulse counterthrusts and to engage reserves. In the zone of the First Belorussian Front, for example, toward evening on 16 April air reconnaissance spotted the advance of enemy reserves from the Berlin area toward the battle line. Bombers of the 18th Air Army flew more than 200 sorties to destroy them. On 17 April the fascist command authorities brought in strong panzer reserves from the Cottbus and Spremberg area. 150 bombers of the 6th Guards and 4th Bomber corps delivered concentrated strikes on these forces. As a result the enemy sustained considerable losses.

In spite of the enemy's fierce resistance, the Soviet forces, pushing through numerous enemy defensive positions, stubbornly advanced. Each day the advance would begin with artillery and air preparation. Combat actions aimed at encircling and defeating in detail fascist force groupings had continuous air support. Massive strikes by ground-attack aircraft and bombers against concentrations of encircled troops immobilized them and prevented them from counterattacking. On 1 May an enemy force which was surrounded near Frankfurt and Guben was wiped out. The troops which took part in this operation were supported by 7 aviation corps.

The defeat in detail of the enemy's Spremberg (21 April) and Cottbus (22 April) forces was successfully completed with active air assistance. From 19 through 30 April a portion of the forces of the First Ukrainian Front were engaged in fierce fighting with the Goerlitz force, which had mounted a counterthrust into the flank of the front and was attempting to drive to the rear of our forces. Its advance was halted on 26 April. The 5th Fighter Corps and the 3rd Ground-Attack Aviation Corps took active part in this. Principal air efforts were concentrated on destroying enemy armored vehicles and artillery. The Goerlitz force was routed on 30 April.

By 25 April two large enemy forces were encircled in the Berlin area: one -- in the forests southeast of Berlin, the defeat of which was completed on 1 May, and the other -- in Berlin proper, which totaled about 300,000 men, as many as 3,000 guns and mortars, and approximately 250 tanks and assault guns. Massive barricades, reinforced concrete bunkers and pillboxes, as well as various permanent-type fortifications were adapted to defense. Aviation combined units of the 16th and 18th Air armies were enlisted to demolish them as well as to disrupt the running of government, military command and control systems. According to the plan, code-named "Salute," during the night of 25 April long-range bombers of the 18th Air Army hit targets in downtown Berlin, while during daylight hours two massive strikes were delivered by the 16th Air Army, involving the participation of 1,486 aircraft, 680 of which were bombers. During the assault on the city's downtown sections, aircraft attacked in waves, in small groups, since the smoke from fires and dust raised by explosions made for poor visibility and hampered massed employment of aircraft. Fighters flew continuous combat air patrol over the city, backing up the ground-attack aircraft and bombers.

On the morning of 1 May the Red Banner of Victory was raised over the Reichstag. The enemy ceased all resistance in the city on 2 May. The instrument of unconditional surrender of fascist Germany was signed on 8 May. The Great Patriotic War and World War II in Europe had come to an end. Soviet forces routed 93 enemy divisions in the course of the Berlin Operation.

Our glorious military aviation made an enormous contribution toward achievement of the brilliant victory of the Soviet Armed Forces. Our pilots flew approximately 92,000 combat sorties in the Berlin Operation, damaged and destroyed more than 500 tanks and armored personnel carriers, approximately 10,000 trucks, 1,750 antiaircraft and field artillery pieces, and blew up 230 supply depots. They downed 1,132 aircraft in air-to-air combat and destroyed more than 100 aircraft on the ground. Soviet air ensured successful ground troops actions at all phases of the operation.

The experience of the Berlin Operation indicated that in order to achieve end strategic objectives it is necessary to establish powerful air force groupings, employ mass air power on the main axes of advance of ground troops, thoroughly and comprehensively to plan and schedule air actions by place and time, flexibly shift efforts in response to successful advance by ground troops, and to consider the possibility of combat employment of ground-attack aircraft in conformity with weather. In addition, effective combat results by air and ground troops are inconceivable without well-organized coordination and centralized, continuous command and control. The efforts of all air armies in the Berlin Operation were coordinated by Commander of Air Forces Chief Mar Avn A. A. Novikov.

Air Forces tactics and operational art were continuously improved in the course of the Berlin Operation. For example, air preparation for the assault phase and support of ground troops had specific features on each front. But all air components were successfully employed in each case. A substantial contribution was made toward elaboration of problems pertaining to employing air in taking a large, strongly fortified city. Intensive airstrikes and

wave-type air actions were employed during the assault on the city, proceeding from the situation on the ground. Additional experience was gained in organizing for and conducting combat actions at night and in adverse weather. Continuity of actions was achieved by redeployment to other airfields both within and between air armies. The task of maintaining operational air supremacy was accomplished chiefly by destroying enemy aircraft in air-to-air combat. 46.6 percent of all sorties were expended on this.

In the concluding phase of the war Soviet pilots and navigators, engineers and technicians, ground maintenance specialists and other military personnel of supporting subunits displayed exceptional courage and heroism, grandeur of spirit and a deep understanding of their role in the liberation mission of the Soviet Armed Forces. Each of them made a worthy contribution to the defeat of hated fascism, which had brought Soviet citizens and the peoples of Europe incalculable misery and suffering.

The Communist Party and Soviet State highly praised the military accomplishment of our fighting men. Many aviation personnel were awarded the title Hero of the Soviet Union. Pilots V. Andrianov, T. Begel'dinov, A. Yefimov, A. Klubov, I. Stepanenko, I. Mikhaylichenko, M. Odintsov, and others were awarded a second Gold Star; all personnel who took part in the operation were awarded the Medal for the Capture of Berlin, and hundreds of pilots, navigators, aerial gunners, engineers and technicians were awarded medals and decorations; 45 aviation units and combined units were awarded the name designation Berlin and Brandenburg.

The magnificence of the feat accomplished by the Soviet soldier-liberator will never fade from the grateful memory of posterity, and the glorious deeds of our aviators will serve as an example to new generations of defenders of the skies of the homeland.

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AIRCRAFT MAINTENANCE GROUPS IMPROVE EFFICIENCY

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) p 22

[Article, published under the heading "The Army's Strength Lies in Discipline," by Sr Lt S. Pr kopenko: "Follow-Through by Aircraft Maintenance Specialists"]

[Text] The incident happened quite some time ago. Many of the people in the technical maintenance unit still remember it, however: the lesson received was that bitter. The incident occurred as follows. Maintenance specialists were completing routine inspection and maintenance on a fighter-bomber. Hydraulic system lines remained to be connected. The technician assigned this operation to a mechanic. Upon completing the job, the latter informed group supervisor Capt I. Mandzyak. Contrary to regulations, however, the officer failed to inspect the job done by his subordinates, and the aircraft was released to the squadron. During the acceptance procedure the aircraft's ground crew also failed to spot an error on the part of the technical maintenance unit specialists. The following morning the aircraft was standing on the ramp, ready for a test flight. During takeoff the pilot noted a pressure drop in the hydraulic system. The fighter-bomber was ordered to return to the ramp. A thorough inspection revealed that the pressure drop had been caused by a faulty job of connecting the lines.

Aviation engineer service supervisors discussed this incident in detail with technical maintenance unit personnel. They then held specific-purpose training drills, and tested each technician and mechanic on his knowledge of the flowcharts. The commanding officer punished the guilty parties. A serious discussion was held with Communist Party member I. Mandzyak at a meeting of the party buro.

The necessary steps had been taken, it would seem. But this disturbing incident compelled the technical maintenance unit chief, his assistants, and the party organization to give some serious thought to how to prevent similar incidents in the future. A definite tendency could be traced. The error occurred because the mechanic had committed a breach of maintenance process discipline. The "chain" was continued by the group chief, who had failed to inspect the job. And lack of proper organization in the conduct of routine inspection and maintenance procedures also was one of the causes of the

dangerous incident. All these factors together characterized the level of competence of management in the subunit and the conscientiousness of the maintenance specialists. It was decided to focus principal attention precisely on this aspect of the problem.

Today the matter of improving technical competence is being advanced to the forefront, and this is understandable. New and more sophisticated aircraft require the most serious attention. And it is precisely engineer-supervisors who are called upon to be the bearers of technical competence.

This was repeatedly the topic of discussion at various conferences, during the totaling of competition results, and at technical maintenance unit party member meetings. It was no simple matter to gain an understanding of the reasons for the shortcomings, and it proved even more difficult to readjust training taking into account today's demands. Not everything was corrected immediately, but a first step had been taken, and others followed....

They began with improving organization of maintenance specialist labor. A trivial detail, one might think, but an interesting feature was discovered upon detailed examination. If during performance of any operation a maintenance technician must take several trips to the supply room or laboratory for needed tools or instruments, this breaks the production rhythm, forces personnel to switch to secondary tasks, dampens work enthusiasm, and forces a wasting of work time. If this continues throughout the entire day, the consequences are quite obvious. The quality of inspection and maintenance procedures suffers as a result.

The technical maintenance unit specialists proceeded to reequip their work stations taking into account data obtained as a result of the analysis. Reorganization produced good results. We know, for example, how much time is taken up by such a laborious operation as readying an aircraft for sight adjustment. The maintenance specialists of the aircraft weapons group under the supervision of Capt V. Balakirev and WO V. Sazhenkov, implementing the recommendations of scientists, the results of observations, and synthesizing all data, designed and built a general-purpose panel. The effect obtained by utilization exceeded all expectations. They succeeded in cutting almost in half the time required to perform the complex operation. This freed up time to perform other preventive maintenance procedures on the aircraft and also improved quality.

The experience of this group's maintenance specialists was synthesized and disseminated by party activists. Its fundamental principles formed the basis of activities by the specialists in the other groups.

The laboratories were also transfigured. This was fostered in large degree by building test benches with a uniform method of performing all maintenance process operations. Each test bench contains the requisite information: a general diagram of the piece of equipment, its typical malfunctions, methods of correcting them, principal specifications and performance data, a list of the needed test equipment, and the most common mistakes made by maintenance specialists. Visual aids make it possible immediately to determine the extent

and nature of the forthcoming maintenance procedures and to avoid errors. All technical maintenance unit laboratories now contain such test benches.

Reequipping of work stations and laboratories proceeded at a particularly stepped-up pace during the period of preparation for a tactical air exercise. In the past technical maintenance unit specialists, upon receiving the readiness signal, would spend considerable time on loading the requisite equipment into trucks. This state of affairs naturally failed to meet the imposed requirements. Following a persistent search effort, WO G. Lang designed and built a general-purpose truck-mounted laboratory version. Now, when the call comes, one need merely close the rack cover, and it becomes transformed into a transport-convenient container. Employment of this novelty has made it possible significantly to shorten the time required for laboratory deployment in field conditions. Other groups have also fashioned such units.

Those times are past when an aircraft maintenance specialist, even a highly proficient one, could intuitively choose manner and method of performing work assignments on aircraft equipment. Today an aircraft is readied for a mission in conformity with flowcharts and using test equipment. This places on engineers particular responsibility for maintaining military and process discipline, for the term "technical competence" is incompatible with slackness and inefficiency. Its improvement is strongly influenced by the engineer's personal example and his participation in the training and indoctrination of subordinates taking into account the propensities and abilities of each.

The aircraft emergency ejection system maintenance group headed by Capt A. Cheslavskiy, for example, is one of the best in the subunit. This officer has succeeded in creating in this small collective an atmosphere of strong demandingness and intolerance toward shortcomings. Cheslavskiy also skillfully utilizes knowledge of the individual features of his men, assigning them operations in conformity with their personality, temperament, and proclivities. Maintenance specialists thoroughly study the equipment, guideline documents and maintenance manuals. All specialists in the group are currently highly proficiency-rated, while WO A. Pisarenko has become master proficiency-rated.

Efficiency innovation activity is an important indicator of growth in technical competence. Technical maintenance unit innovators are making a substantial contribution toward increasing combat readiness. Over a year's time they have submitted and adopted 24 efficiency innovation suggestions, nine of them in the collective headed by officer V. Chetvertov and five in the group led by Capt A. Pogrebnoy. Their adoption has made it possible to shorten by 10 percent the time required to perform routine inspection and maintenance in one group, by 15 percent in another group, and by 25 percent in Capt V. Balakirev's aircraft armament group. Incidentally, on totaling up competition results the commander invariably names among the top finishers the maintenance groups headed by officers A. Pogrebnoy and V. Balakirev. They bear the title of excellent and are leaders in the socialist competition to honor in a worthy manner the 40th anniversary of victory over fascist Germany.

The military outfit's entire tenor of life, an atmosphere of strong demandingness and verification of execution, and thoughtful organization of

every work station stimulate the labor of the aircraft maintenance specialists and foster improvement in their technical competence.

The technical maintenance unit has maintained its title of excellent for the fourth time running. Based on last year's results it was awarded the Best Technical Maintenance Unit in the District challenge prize. The outfit has presently been nominated to take part in the competition for the best technical maintenance unit in the Air Forces. This compels the subunit's party members to evaluate achievements to date in a critical manner and to work persistently to reveal and effectively to utilize reserve potential. To utilize all available opportunities and possibilities means to take another step toward the heights of combat expertise.

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SCIENTIST REMINISCES ABOUT EARLY SPACE PROGRAM

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) p 27

[Article, published under the heading "History of the Space Program," by Doctor of Medical Sciences Professor Vladimir Ivanovich Yazdovskiy: "'Unskilled Workers' of Space"]

[Text] The first manned flight in space was preceded by almost 13 years of hard, intensive work by our scientists, design engineers, physicians, and other specialist professionals. It was necessary scientifically to validate the possibility of space flight and to devise an aggregate of measures ensuring the safety of a manned mission. On the eve of Cosmonautics Day AVIATSIYA I KOSMONAVTIKA correspondent V. Zolotarev asked State Prize recipient Doctor of Medical Sciences Professor Vladimir Ivanovich Yazdovskiy to share his recollections of that time.

At the end of 1948 I met Korolev on the recommendation of Andrey Nikolayevich Tupolev. I remember Sergey Pavlovich as a passionate, purposeful man of initiative. He offered me the position of being in charge of rocket medical-biological research. It was a new problem area and, quite frankly, I was a bit apprehensive about tackling it. I was intimidated by the strange, mysterious, and little-known that lay hidden behind the word "space." As a scientist I was naturally cautious with my reply. But Sergey Pavlovich had this way about him! He immediately made a believer out of me. My final initiation to the new endeavor took place in the office of institute head Aleksey Vasil'yevich Pokrovskiy. He gave his blessing to my new position, as it were, releasing me from my former tasks.

Where should I begin? First of all it was necessary to devise a research program, to design and build equipment which would work reliably and without malfunction in self-contained mode during rocket flight. Pokrovskiy assigned Vitaliy Ivanovich Popov to assist me, and later Aleksey Dmitriyevich Seryapin as well. We drew up a multiyear program, in which we scheduled research on representatives of the animal world. This essentially marked the beginning of validation of the possibility of manned space flight.

The aggregate of measures ensuring the safety of a manned mission included developing equipment to record and monitor the physiological state of living organisms and that environment which would be created in small spaces, as well as a recovery system (two ejectable carriages, high-altitude pressure suits, and parachutes).

After completing the first phase of in-flight investigations using animal subjects, we proceeded with the more extensive research of the second phase involving rocket flights.

A flight would proceed as follows. At an altitude of 112 kilometers a geophysical rocket's nose cone would separate and free-fall in a ballistic trajectory. The starboard ejectable carriage would eject at an altitude of 90 km, the parachute system would trigger after 3 seconds, and the animal would descend from this altitude to the earth. The second carriage would be ejected into the atmosphere at an altitude of 45 km, at maximum dynamic pressure. It was out of the question to deploy the parachute immediately -- it would burn up, and the animal would perish. Nine such launches were made.

These were followed by flights to 200 and 450 km. We gradually amassed experience, and the obtained results enabled us to transition to orbital flights. Thus Soviet scientists blazed the trail into space step by step.

Literally one month after launching of the world's first artificial satellite, the significance of which, incidentally, the United States made every attempt to play down, the dog Layka was launched into space. This so stunned the Americans that at first they did not even believe this success of the Soviet space program. Only after Layka's electrocardiogram signals were picked up and recorded in the United States and Japan were the skeptics across the sea forced to call it a history-making flight. Soviet scientists received unique data, the significance of which can scarcely be exaggerated.

The question of manned space flight now became a practical agenda item. At this time the dogs Belka and Strelka, Pchelka and Mushka had already made orbital flights in a descent-capable orbital vehicle. An important experiment took place in March 1961, which included two launchings of "unskilled workers" of space on board a recoverable orbital vehicle. A rubber mannequin in a high-altitude pressure suit with all automatic devices hooked up was placed in the ejection seat, where the pilot would ride. Material was removed from the "chest cavity," "abdomen," and "thighs" and the resulting cavities populated with black, gray, and white mice, rats, guinea pigs, reptiles, human skin tissue, (Khela) cancer cells, plants, seeds, and microbes -- in short, almost all representatives of our evolutionary biological ladder. Both launches demonstrated that all systems had been perfected and that the aggregate of measures ensuring mission safety were reliable.

Cosmonauts had completed training by this time. The work load was heavy, but they had stood up under it, and this also inspired hope. Each of them was witness to the selfless labor of scientists, designers, engineers, workers, physicians, and the operations people -- specialists in all space launch center services. And each one felt a strong sense of responsibility for the success of the new undertaking.

At a meeting of the State Commission on 9 April 1961 it was announced that party member Yuriy Gagarin had been named the first cosmonaut to go up.

On the morning of 12 April Sergey Pavlovich and I entered the cottage where the cosmonauts were staying. Following a final briefing with Yuriy Gagarin and German Titov, we headed for the launch pad. The cosmonauts were delivered to the pad in full gear. If Gagarin's pressure suit were to prove defective, his backup would fly the mission. We then headed for the bunker. A great many people had gathered there. Everybody was nervous. When the tension had become extreme, Sergey Pavlovich asked me, as if to releave the tension: "Well, Volodya, have you bitten your lips raw?"

"And why are you so pale?" I replied to him in kind.

The launch command was given. Sergey Pavlovich wished Gagarin bon voyage. He heard in reply the now-famous "Poyekhali [And away we go]...."

When the report came that the vehicle had passed over Kamchatka, we came out of the bunker and became somewhat calmer. Preparations began for the return to Earth.

Thus began the era of manned space flight. These flights have become the pride of our country, of the entire Soviet people.

3024
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SQUADRON PARTY BURO SECRETARY DOES FINE JOB

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 30-31

[Article, published under the heading "The Army's Strength Lies in Discipline," by Maj N. Antonov: "The Main Link"]

[Text] The 26th CPSU Congress and the June (1983) CPSU Central Committee Plenum, attaching great importance to further enhancing the role of primary party organizations in the daily life and activities of collectives and in the ideological indoctrination of Soviet citizens, pointed out that a most important practical task of these organizations is that of increasing activeness, initiative, and integrity. The party's demands always occupy the center of attention of the party organization in which Capt Ye. Nikolayev serves as secretary. Here party members ensure in a practical manner a vanguard role in combat and political training as well as in military discipline. This determines the outfit's success in socialist competition.

The silvery aircraft taxied to the ramp. The rustling whistle of the turbine dropped to a low pitch and fell silent. Squadron deputy commander Military Pilot 1st Class Capt Ye. Nikolayev, back from an intercept, pushed open the canopy. He was hit by the mixed smells of melting spring snow and fuel, and his ears were assailed by the roar of jet engines. Yevgeniy Vasil'yevich was still thinking about the flight. He thought back to that gray blanket of clouds, the greenish sight display with the floating electronic pipper, and the crosshairs....

It had been a difficult intercept. The fact is, Nikolayev had long since ceased dividing missions into easy and difficult. During his years of flying he gained the realization that there is no such thing as a simple flight. He had learned a hard and fast rule back in his lieutenant's days: every assigned task must be carried out with a full effort. At first this was accomplished by conscious effort, while subsequently it became habit, a determining character trait.

His comrades frequently turned to him for advice and paid careful heed to his opinion. The Komsomol members had elected him to the Komsomol buro. The command authorities highly rated this determined, serious officer and capable pilot. As a senior pilot and flight commander, Nikolayev studied himself and instructed his men. He was demanding of them, but doubly so on himself. And his flight was held in high regard. Yevgeniy Vladimirovich was content: he had become a pilot 1st class and had mastered a fighter which was new to him. He had a clear picture of tomorrow's tasks and prepared himself to carry them out.

In the meantime the training year was drawing to an close. The time had come for accountability reports and elections in the party organizations. Communist Party member Nikolayev became the new party buro secretary. This meant considerable trust, and at the same time responsibility and a great many concerns. The situation was complicated by the fact that some of the subunit's headquarters staff officers had been replaced that year. Experienced leader-communists, activists well acquainted with the state of affairs in the squadron were replaced by new persons who had a great deal to learn. And, the main thing, it was necessary not only to hold achieved performance levels in combat and political training and socialist competition but to reach even higher ones.

The command authorities and political section promptly rendered effective assistance to the newly appointed leader-communist. After the report-election party meeting, political section officer party member V. Gruba got together with Capt Ye. Nikolayev, helped him schedule his work, and suggested to him where he should focus his attention and what he should do on a priority basis.

"Greater reliance should be placed on the body of activists, Yevgeniy Vladimirovich," he said. "But don't turn into an administrator; you would do better to study the state of affairs in the collective, become better acquainted with the men, and learn about their concerns, aspirations, attitude. And they will follow you."

The advice by his older comrades was very helpful to the young party buro secretary.

The squadron had logged a considerable number of hours according to the year's figures. There had not been any equipment malfunctions through the fault of personnel. The majority of aviation personnel had become high proficiency-rating specialists. But this of course could not allow any resting on laurels by Nikolayev, the squadron commander, his deputies for political affairs and aviation engineer service, or the members of the party buro. Standing behind the numbers and growth percentages were living people, pilots and maintenance technicians, with whom they would be working and accomplishing assigned tasks.

Alongside successes, unfortunately there were shortcomings as well. For example, concern was raised by an incident with pilot Sr Lt A. Lebedev, who displayed negligence in readying for a flight, leading to a near-mishap situation. This officer was sternly called to account, both professionally and by the party. Servicing group chief Capt M. Mikhaylyuk was punished for errors of omission in performance of duty and for violations of military

discipline. There were also noted other instances of lack of discipline on the part of certain Communists and Komsomol members. Thoroughly examining each specific case, Nikolayev saw that punishment combined with explanatory work as a rule had exerted considerable indoctrinational effect not only on the guilty parties but on other aviation personnel as well. Senior Lieutenant Lebedev, for example, learning a lesson from what had happened, committed no more violations. Others also proceeded to toe the line. But not everybody. Instances of violation of discipline continued.

"Why are these things happening? What can be done to eliminate deficiencies?" Nikolayev asked himself. In the political section he conferred with experienced leader-Communists and party activists officers M. Osipov, V. Gruba, and others. The young secretary sought answers to questions bothering him in guideline party documents and in the proceedings of the Sixth Armed-Forces Conference of Secretaries of Primary Party Organizations, and turned to newspaper and journal articles, which reveal general party experience and know-how in resolving such problems. And he gained an understanding of a great deal. For example, he began to gain a clear picture of the need to conduct political-indoctrination work purposefully and continuously. He also came to grasp what a powerful reserve potential the personal example of Communists and their vanguard role can become in accomplishing combat and political training tasks, and particularly in strengthening military discipline and organization.

Yevgeniy Vladimirovich shared his thoughts with squadron commander Maj I. Vasilaki, his deputy for political affairs Capt I. Bakhanets, and his deputy for aviation engineer service A. Kozlov. Making common cause, the officers specified a common line of policy in their work. It consisted in ensuring that measures taken by the subunit command authorities in matters pertaining to strengthening discipline and increasing the squadron's combat readiness occupied the center of attention of the party organization, that by its forms and methods it supported their decision, with the activities of the body of activists and the entire party organization being directed toward increasing the personal responsibility of each and every party member for the assigned task.

The secretary raised this question at the next party meeting. The party members voiced support for the proposed directions of effort.

The regimental command authorities and political section were keeping informed on the squadron's affairs. The first steps taken by the party buro secretary and subunit's body of activists were gratifying.

Strengthening of military discipline was for Captain Nikolayev the main link in the overall chain. He had no doubt that successful accomplishment of this task also determined further increase in the subunit's combat readiness, accomplishment of socialist pledges, and maintaining a healthy moral climate in the collective. First and foremost the officer concentrated attention on those who were violating discipline. There were only a few of these in the squadron, but they included Communists, officers responsible for important areas of work.

Many adverse comments, for example, were made to aircraft technician Sr Lt S. Chelovechkin: sometimes he would be late in reporting for duty, and sometimes there was a lack of proper order at his aircraft's flight line position. He would be put on report, they would have a heart-to-heart talk with him, but nothing changed. Captain Nikolayev began to pay closer personal attention to this officer. He watched him working on his aircraft, spoke with his superiors, fellow servicemen, and determined his circle of acquaintances. He was favorably impressed with the senior lieutenant as a ground maintenance specialist: he was a knowledgeable, competent technician who likds his job. But he was a person lacking a solid internal core, with a lack of concentration, and in addition he evidently did not have much faith in his own ability. Such individuals easily come under somebody else's influence.

This was indeed the case. Sergey was drawn to one of the officers, a moody individual with a peculiar character and personality. The party buro secretary could clearly see that there was no serious basis for their friendship, since they had no common interests. He conferred with the squadron deputy commander for aviation engineer service, party buro member Capt A. Kozlov. They decided to work together. Kozlov, who knew that Chelovechkin was a competent welder, asked him to help the efficiency innovators. The technician consented, set to work, and subsequently became so enthusiastic that he himself came up with an interesting innovative idea. Common interests drew him together with his fellow servicemen, opened up a new value in comradely relationships, and filled his intellectual world with new content.

Of course all this took time. The party buro secretary had many serious conversations with Sergey, reminded him of his party duty, helped him gain his bearings, and instilled faith in his own ability. Now the senior officers have a different opinion of this officer: he is composed and efficient, has a completely responsible attitude toward his job, and evokes no adverse comment. This year the Communists elected him party group organizer.

There are many such examples in the party buro secretary's work with the men. Each time he looks for an individual approach to a person and not only seeks to ensure that a given serviceman carries out his job-related duties to the letter and does not violate military discipline. His aim is much broader: to eliminate motivations which impel a person to commit misdeeds. Captain Nikolayev endeavors to utilize the most effective methods of party influence.

He had numerous talks, for example, with group technician Sr Lt V. Kukresh. The officer assured him that he would change his attitude toward his job and would commit no further breaches of discipline. His words failed to match his deeds, however. Kukresh was summoned to an enlarged meeting of the party buro, to give an accountability report on personal exemplariness in observance of military discipline and performance of his job-related duties. He was about to give a bunch of excuses and once again make promises, but the leader-communist party buro members laid it on the line: there is no point in looking for guilty parties elsewhere -- you yourself are guilty! And they pointed out in a straightforward and party-minded way the incompatibility between his conduct and his title of member of the CPSU.

This talk had an effect on Kukresh. He realized that he could not count on his comrades letting him off lightly and that he must seriously reexamine his conduct and attitude toward his job. Captain Nikolayev saw that a change was taking place in this party member's consciousness, that he needed support and help precisely now. The secretary himself and party buro members A. Kozlov and V. Ivanchuk talked again with Kukresh on several occasions, took him to task for every error of omission, and praised his efforts.

Thoughtful individual work with this officer is producing results. But the party members realize that the process of education, and particularly a moral and psychological character turnabout is not a matter of a single day or even a single month, that not all forms and methods have as yet been utilized here. One thing can be said with assurance: they are not going only half-way in their efforts on behalf of a fellow Communist.

In the course of his daily concerns, time passed swiftly for Yevgeniy Vladimirovich. And once again it was time for the report-election party meeting. Party members spoke with pride about the fact that the squadron had not slipped and had achieved new performance highs in combat training. Instances of negligence, lack of discipline, and irresponsibility have become rare. And naturally credit for this must go to the party buro. But there were also many critical comments and useful suggestions. Who should continue carrying on the good work? The members decided to reelect Nikolayev!

Once again work, work.... We know that the professional training of a fighter pilot requires total effort. Yevgeniy Vladimirovich placed increased demands on himself. He realized that a party leader has no right to make a mistake or take the slightest false step, for people set him up as an example not only on the ground but in the air as well. It is for this reason that he prepares so thoroughly for each training sortie, and it is for this reason that his every control movement in the air is made with a jeweler's precision.

This year the squadron was faced with new and more difficult tasks. Demands increased also on the work of the party organization. The matter of ensuring a vanguard role by Communists in combat training and discipline remains a principal issue. Now the party buro, possessing a certain amount of experience, approaches accomplishment of this task with higher sights. There was a time when Nikolayev thought about how not to ignore deficiencies or fail to respond to deviations on the part of some comrades from the requirements of the CPSU Rules and guideline documents pertaining to performance of military duties. Today the party buro is encountering such instances with increasingly less frequency, and it is directing its principal efforts toward preventive work.

At a meeting of squadron headquarters staff officers, Capt Ye. Nikolayev suggested more frequent presentation of reports by leader-communists on the state of affairs in the collective. The squadron commander and the other comrades voiced their support.

Soon Capt A. Makov, commander of an excellent-rated flight, was summoned to a party buro meeting. This officer displayed an example in all things, both as a party member and commander, and did a great deal of work with his men. And

the buro members took note of this. But they directed his attention to another point: party integrity and demandingness. They reminded him that on a certain occasion one of the pilots, out of carelessness, made a calculation error, which was discovered during verification of readiness, and they reminded him that a young aviation engineer service specialist had done a slipshod job in readying equipment for a training sortie. At first glance their errors seem trivial. This is not so, however. And a flight commander, the buro members emphasized, should not ignore such instances. They recommended that party member Makov increase his demandingness on his subordinates and more extensively utilize methods of indoctrination work in strengthening discipline. Since that conversation Captain Makov has been precisely following his comrades' recommendations, and things have been going much better in the flight.

Demandingness and integrity have become fundamental in the work not only of the party buro members but also of the squadron party organization as a whole. This perhaps best of all characterizes its maturity and an activist attitude on the part of every CPSU member. One cannot help but recall at this point a party meeting held after rehearsing a drill involving redeployment to another field. Although the collective accomplished the mission, nevertheless there did occur annoying mistakes and errors. At this meeting party members spoke in a sharp and shelf-critical manner, while things were still fresh in their minds. There were no indifferent individuals. The leader-communists and political section officers who were present at the meeting noted with satisfaction that the outfit was on the upswing, that a healthy ideological-moral atmosphere prevailed, and that it was fully capable of accomplishing the difficult combat training tasks during the year of the 40th anniversary of the Great Victory and preparations for the 27th CPSU Congress.

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SQUADRON POLITICAL OFFICER HANDLES DISCIPLINE PROBLEMS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 32-33

[Article, published under the heading "Be Alert, In a Continuous State of Combat Readiness," by Maj V. Dolgishev: "Time for Flying High"]

[Text] A heavy mist shrouded the hushed field airstrip. The weather was not conducive to flying. Nevertheless the tactical air exercise commenced.

Leaving the roar of turbines behind, a red-starred aircraft shot sharply skyward and, climbing, disappeared in the clouds. The aircrew was on a difficult mock combat mission.

Under conditions of limited visibility, Military Pilot 1st Class Gds Capt A. Smetskov and Navigator 1st Class Gds Capt S. Nikitin were to proceed to a designated area and conduct reconnaissance of "enemy" dispositions. Particular importance was attached to this mission. Its results would determine in large measure the actions of ground subunits. This is why they sent up an excellent-rated aircrew which had repeatedly achieved vanguard performance marks in socialist competition.

On the eve of the exercise the crew members had given long thought to the question of how best to proceed to the search area. Finally they decided on a variation suggested by the navigator. After passing the "line of contact," he suggested, they should proceed not on a straight-line course (the "adversary" had most probably concentrated large quantities of air defense assets along the shortest route), but rather a more complicated route configuration. They would proceed at a higher altitude for part of the distance, descend at a designated point and enter the search area at minimum low level. A variable flight profile, Nikitin argued, would also make it possible to preserve a high degree of working efficiency for carrying out the principal element of the mission -- spotting and photographing the objective. The regimental commander gave his approval to this mission configuration.

...A railway bridge spanning a narrow river appeared unexpectedly. The navigator's practiced gaze, however, captured every detail: the bridge girders, furtively peering out through the mist, the dirt road along the left bank of the river, and marks left on the road by tracked vehicles. And, most

important, next to the brush along the riverbank stood little gray hills of amazingly uniform appearance. "Camouflaged missile launchers," the navigator suddenly realized.

"Target in sight," Nikitin reported to the pilot. "Right turn...."

The guardsmen succeeded in detecting and photographing the target on the first pass. The pilot, flying at extremely low level, where it would be quite difficult for the antiaircraft crews to put their sights on an aircraft flying at high speed, headed out of the search area. The "adversary" was unable to offer serious countermeasures to the reconnaissance aircraft.

During that flight operations shift the other aircrews also performed as in actual combat: boldly, with calculation, and flawlessly. Nor could it have been otherwise. Joining socialist competition under the slogan "Our selfless military labor in honor of the 40th anniversary of the Great Victory and the 27th CPSU Party!", the unit's aviation personnel are continuing with deeds the traditions of the combat veterans. And the regiment's combat biography, which embodies unfading military glory, is rich in brilliant, heroic events. During the Great Patriotic War nine of the regiment's pilots were awarded the lofty title Hero of the Soviet Union. The regiment had the following motto during the war: "The privilege of going out first shall go to the worthy."

The right-flankers of the present generation of combat pilots include Guards Captain Nikitin. He has repeatedly earned the title of best navigator in the regiment. He is compelled to do so by the honor of the vanguard performer and duty of the leader-communist, for Nikitin is not only an air navigator but, figuratively speaking, a ground navigator as well -- he is the squadron deputy commander for political affairs. And Nikitin maintains that the principal strength of a Communist, especially a political worker, lies in personal example. This is true. It is precisely this strength which constitutes a kind of gold reserve and ensures genuine value to the words spoken by the deputy commander for political affairs.

This job is no easy one. During the war years aviation political workers were called "flying commissars." Their weapon was the impassioned party word, reinforced by deed -- personal example in combat....

"We endeavor to be worthy of the combat veterans," proudly declare the young aviators, who have inherited the heroes' fame. And this pride is expressed in attitude toward one's job and in an endeavor to do an excellent job of mastering aircraft which are new to them.

The biography of Gds Capt S. Nikitin, a political worker of the 1980's, is as straight and uncomplicated as a runway -- 10-year school, military aviation school, and a duty assignment in a line regiment. Here he mastered in a short period of time the aiming and navigation systems of an aircraft which was new to him, and he passed the tests for first class. The subunit's Communists accepted him into their ranks. They liked the purposefulness of this officer, his thirst for knowledge, and his love for a profession he had chosen early in life. They also liked his sociability. One cannot imagine Nikitin being

alone. He is always in the company of others and constantly ready and willing to engage in a meaningful conversation or to come forth with a witty remark.

The development of the young aviator proceeded in this manner, and not only his professional development. He was learning to work with others, as well as the ability to respect the opinion and labor of others. Perhaps it was precisely at this time that traits of the political worker were born in his character: initiative and competence, a high degree of party-mindedness and implacable opposition to shortcomings, and a sense of the future.

The young officer was proceeding toward an understanding of his profession, his party and professional duty whereby the heroic merges with the mundane, the daily routine in one's consciousness and one's practical activity, when the right to indoctrinate others is confirmed both by word and deed. Just as the political workers of the 1940's, Nikitin was gaining respect and authority by means of personal example, efficiency, modesty, and at the same time firmness in matters of principle, by party-minded uncompromisingness, and once again by the ability to find contact with others.

"The commissar, political instructor, and political section personnel," stated the newspaper KRASNAYA ZVEZDA during the war years, "should be closely bound to Red Armymen and commanders by thousands of threads, as genuine leaders of the masses.... Always with the masses and leading the masses -- this is an inflexible guiding principle for every commissar and political worker."

This rule also guides today's political workers. And this time also, when the commanding officer was giving a follow-up briefing on the new mission, Guards Captain Nikitin proceeded to the group of aviators to tell them how the flight had gone, to buck up their spirits, and to instill confidence that it would be a successful mission.

"It can be done," he smiled, "although it's no picnic. Certain factors must be considered...."

And he proceeded to tell them the best way to enter the search area and the easiest direction from which to set up their maneuver....

The pilots' spirits improved: each one proceeded to his aircraft composed and confident of victory. The deputy commander for political affairs, seeing subunit party buro secretary Gds Capt A. Shiryayev by his aircraft, hurried over to him.

Just prior to the tactical air exercise, having been briefed on the mission by the squadron commander, the two of them prepared a party-political work schedule. They covered every detail: briefing and task assignment of party and Komsomol activists, assistance to flight commanders and servicing group chiefs in organizing socialist competition, preparation of operational news sheets and other materials for prompt dissemination of information on the course of the tactical air exercise, plus many other items. How was the plan being implemented?

He noticed from a distance that Shiryayev was smiling. That meant that things were going well.

The first months of Nikitin's work as deputy commander for political affairs coincided with an extremely busy period for aviation personnel. The subunit's personnel were familiarizing themselves with equipment which was new for many of them, and the young political worker had both to study himself and assist the commanding officer in training the pilots and navigators. While things were proceeding without complications in the professional aspect, as they say, at first there were problems with organization of indoctrination work.

It was hard for the young political worker to focus on the main thing due to a great abundance of tasks. A great many activities were currently in progress in the squadron. And Nikitin had no confidence in their effectiveness. The squadron commander gave him some help.

"Our problem spot," Gds Lt Col G. Ryabukha said to him, as if defining what was bothering the deputy commander for political affairs, "lies in complacency on the part of some aviation personnel. Hence the disciplinary problems in some flights."

At first it seemed to Nikitin that the commanding officer was exaggerating, for on the whole it was a strong and aggressive outfit. It was not mere happenstance that the squadron had maintained a rating of excellent for 6 years running. Upon giving the matter some thought, however, he realized that the commander's words contained party-minded prescience, which prevents one from being seduced by achieved results and from refusing to address unresolved problems.

One of the distinctive features of a genuinely cohesive outfit is strict, by-the-book discipline. And there were problems in this area. For example, one of Gds Sr Lt I. Voropayev's men had committed a disciplinary infraction. The squadron commander punished the remiss individual. The subunit's party members also appropriately assessed the incident. A frank discussion was held with party member I. Voropayev at a meeting of the party buro. But things in the outfit were not improving. "I've got to give some serious attention to this group," the political worker decided. He began to look in on them more frequently. He would drop in as if for the purpose of conferring with the party group organizer, giving a work assignment to the members of the wall newspaper editorial board, and conversing with the men, while at the same time he endeavored to get a handle on the men's interrelationships and elucidate the position of the servicing group chief. He finally realized that Voropayev considered as his main task that of keeping the equipment in proper working order, while he felt that it was the duty of the commanders and political worker to indoctrinate subordinates.

"How can he be convinced otherwise?" Nikitin pondered. The efforts he undertook failed to correct the situation in the subunit. Military discipline in the servicing group continued to leave much to be desired, and the quality of preflight readying of aircraft worsened. A near-mishap situation occurred through the fault of one of the ground maintenance specialists. The deputy

commander for political affairs decided to have a talk with his more senior comrades, experienced methods specialists and indoctrinators.

"The main thing is for all aviation personnel, especially the younger ones, to perceive the need for discipline as a vitally important element of military service," he was told by the political section deputy chief Maj M. Korotkikh. "But how can this be achieved? "Eminent Soviet educator Anton Semenovich Makarenko," Korotkikh continued, picking up a small volume, "said that you can do as much forcing a person to work as you wish, but if at the same time you do not indoctrinate him politically and morally, if he does not take part in societal and political affairs, this labor will be simply a neutral process and will not produce a positive result."

Some time later the deputy commander for political affairs discussed all this with Voropayev. At first the latter tried to avoid a frank conversation, but gradually he got talking. Together they reflected on what should be done to ensure that the group's ground maintenance specialists become aware of their responsibility for their labor, and how to overcome their sluggishness and indifference.

For a beginning they decided to hold a special evening event in the group and to invite unit veterans to attend. Soon such a get-together was held. This time instead of dry, boring lectures there were inspiring presentations by combat veterans on the importance of discipline in battle and on the sanctity of regulations elaborated through harsh military experience.

The young aviation personnel looked at themselves and at their contribution to the common cause in the light of the exploits of the combat veterans.

This special evening event is only one episode from the determined day-by-day indoctrinational work which began to be carried out in the group. Under the influence of the deputy commander for political affairs, Voropayev aggressively set to work. Some time later the collective became one of the squadron's performance leaders.

The young political worker did not suddenly or immediately develop organizer skills. The main thing is that he became increasingly aware of the fact that the men needed his work, that his work was inconceivable without sincere participation in the men's fortunes, without attention paid to each individual and an endeavor to help those who needed it.

The people in the squadron still recall an incident where at the very commencement of flight operations an air near-mishap situation occurred through the fault of Gds Lt P. Voron. This was discussed first at a meeting of officers and subsequently at a party meeting as well, after which Nikitin, realizing the state of the young ground crewman, decided to have a talk with him. They talked long into the evening. The political worker talked about his job, about how he was currently in the process of mastering a new aircraft, and inquired about the thoughts and concerns of his subordinate.

Soon the squadron commander asked: "Sergey L'vovich, what is to be done with Voron? Should he perhaps be suspended for a time from aircraft servicing?"

"I don't believe he should. Right now the best healing remedy for him would be our trust and oversight," replied Nikitin.

The squadron commander agreed with his deputy. Time confirmed the correctness of this decision. Attention, help, oversight, and trust played a positive role. In time the officer boosted his proficiency rating and became an active efficiency innovator. Not long ago the coveted pentagon -- the Unit Excellent-Rated Aircraft symbol -- appeared on the fuselage of the aircraft he services.

Guards Captain Nikitin is party-mindedly firm. When necessary he can take a rigid stand. This officer understands well that, to use a navigator's words, some individuals need a more steeply-banked turn to return to the courseline.

...There is a time in the career of every officer which can be called a time for flying high. For Guards Captain Nikitin it coincided with his period of familiarization in the position of squadron deputy commander for political affairs. The outfit confirmed its rating of excellent on the basis of last year's performance results. His work is a factor in this result. There is nothing more important for a political worker-officer than to be needed by others, to endeavor to ensure that they are profoundly aware of the need for their military labor and to feel satisfaction from the job they have done. The sooner this height is reached, the more satisfaction his job will bring and the more frequently he will experience the joy of success on his difficult journey.

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COMMUNIST, CAPITALIST WAYS OF LIFE COMPARED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 34-35

[Article, published under the heading "At the Fronts of the Ideological Struggle," by Candidate of Philosophical Sciences Lt Col A. Fedurin: "Two Worlds -- Two Ways of LIfe"]

> [Text] A developed socialist society has been built in the Soviet Union. This fact is a great achievement of the Soviet people. The entire political activities of the party, its strategy and tactics are aimed at improving the lives of Soviet citizens, at implementing socialist ideas, and at reaching the level of the most demanding concepts of developed socialism.
>
> All this is arousing hatred in our enemies. Imperialist propaganda has unleashed a campaign of unprecedented scope and scale, aimed at undermining or at least weakening the enormous attractive force of genuine socialism. The Soviet way of life has become one of the targets of savage attacks by bourgeois propaganda, one of the focal points of acute ideological struggle. This is why it is very important that each and every Soviet citizen be cognizant of the root advantages of our way of life over the bourgeois way of life and be able to defend it aggressively against attacks and distortions. In this connection it is important to note that counterpropaganda, to quote V. I. Lenin, under no circumstances should contain elements of justification but should constitute publicity of our own views and a countering force to those views which they are trying to foist upon us.

A realistic appraisal both of our vast achievements and of existing problems enables us to single out the most typical features characteristic of the Soviet way of life and to demonstrate its superiority over the bourgeois way of life.

First of all it is necessary to note the labor character of our way of life, of the entire Soviet society and of all its citizens. The concisely-expressed principle "He who does not work does not eat," commented V. I. Lenin, is the

foundation of socialism, an ineradicable source of its strength and an indestructible guarantee of its ultimate victory. Inherent in socialism is free labor for oneself, in the process of which a person not only produces material or spiritual goods but also confirms himself as an individual.

Labor under socialism is a basic criterion for assessing a person's merits before his fellow citizens, and his place in society is determined by labor. The majority of Soviet citizens work honestly, putting their heart into it, safeguarding and adding to our nation's assets.

In the West the United States, the main citadel of imperialism, is presented as the ideal of the bourgeois way of life. Shutting their eyes to the acute conflicts and contradictions of capitalist realities, bourgeois ideologists attempt to present capitalism as a society of equal opportunities. As we know, however, there is not and cannot be a uniform way of life, common to all individuals, in an antagonistic society. In such a society there exists on the one hand refined luxury, and on the other hand poverty and misery. In the United States, for example, a mere 5 percent of the population possesses 55 percent of the national wealth. A total of 125 billion dollars are concentrated in the hands of the 400 richest Americans, while the remainder of the country's citizens are worth an aggregate total of 126 billion dollars.

The bourgeois way of life is characterized by alienated labor, grounded on the discipline of hunger, as well as unemployment for the working people, crass materialism and parasitism on the part of the ruling classes. Labor, if one engages in it, is a means, an instrument for attaining a social position whereby one need not work. "As soon as the compulsion to work ceases," wrote Karl Marx, "they run from it like from the plague." At the same time tens of millions of people in the capitalist world are deprived of the vitally important right to labor and feel superfluous to society. In the United States, for example, more than 8.15 million Americans were without work at the end of last year, or 7.2 percent of the country's total hired labor force. Thirty-five million people live below the official poverty level, while 3.5 million persons regularly do not get enough to eat. Hunger and poverty push many young people into the ranks of hired killers. Schooled in drill and hatred, they become in return for dollars an obedient instrument of defense of the interests of the bourgeoisie. The misanthropic countenance of the American pilot runs the gamut from the attacks on the Japanese cities of Hiroshima and Nagasaki to large-scale spraying of toxic chemicals in Vietnam, from bombing attacks on the cities and towns of North Korea to rocket bombardments of centers of resistance on Grenada.

Things are different in our country. The USSR Constitution proclaims: "Military service in the ranks of the USSR Armed Forces is an honorable duty of Soviet citizens." For young people it is an important school of ideological maturity, labor indoctrination, and citizenship.

We are proud of the collectivism of our way of life, characterized by mutual assistance, comradeship, and cooperation among free working people. In place of the bourgeois principle of the law of the jungle, a new principle is affirmed, the principle of collectivism and comradely mutual assistance -- "One for all and all for one."

Collectivism permeates the entire tenor of life in the socialist military. Strengthening of collectivism in conditions of steadily growing complexity of servicing, maintenance and combat employment of modern aircraft and other systems is one of the most important factors in a normal moral-psychological climate in military units and subunits, and consequently in increasing their fighting efficiency and combat readiness.

The patriotism and internationalism of Soviet citizens constitute the highest manifestation of a spirit of collectivism and comradeship. Ardent love for the homeland and total devotion to the cause of socialism serve as an inexaustible source of military and labor exploits by Soviet citizens. The mighty force of Soviet patriotism and proletarian internationalism was fully manifested in the flame of the Great Patriotic War. Every one of its 1,418 days and nights are testimony to the great staunchness and unparalleled heroism of our people and their devotion to internationalist and patriotic duty. Today as well Soviet servicemen are perceived by the entire world as selfless and courageous patriots and internationalists, who are giving assistance to the Democratic Republic of Afghanistan in defense of the achievements of the April Revolution. The heroic military deeds of many of them, including aviation personnel, have been rewarded by lofty government decorations.

On the other hand, bourgeois society is characterized by individualism, egocentrism, nationalism, and chauvinism. In the opinion of the founders of Marxism-Leninism, it engenders only "surrogates of collectivism," for the very economic laws of capitalism inevitably engender competition which, as K. Marx noted, "isolates individuals from one another -- not only the bourgeois but proletarians to an even greater degree...."

In the United States all progressive movements are brutally repressed. Racial discrimination is the fate of tens of millions of Negroes, native Americans, Chicanos, and other "less-than-100-percent" Americans. Terrorism, elevated by the present U.S. Administration to the status of government policy, tramples the rights of freedom-loving peoples and nations. Examples of this include Grenada and Lebanon, Nicaragua and Afghanistan, Cuba and Angola. Under Washington's protection are antipopular dictator regimes and such reactionary forces as the Pinochet butchers, the "death squads" in El Salvador, the jailers in Seoul, the South African racists, and the Israeli occupation forces.

Soviet realities are characterized by genuine humanism and democracy, which affirms humanity in relations between people. Man, his interests and needs stand at the center of attention in our society. Socialism proclaims, and implements to the extent of its ability, the principle of "Everything for the sake of man, everything for the good of man."

Ours is a working democracy, which secures and defends the interests of toilers in a practical manner. Socialism guarantees both political freedoms and broad social rights -- the right to labor, health care, housing, financial security in old age, free access to education and culture, as well as confidence in tomorrow.

CPSU activities are permeated with concern for the working person and a steady rise in the people's material and cultural living standards. For example, real per capita income in this country will rise by 3.3 percent in 1985. National income utilized for consumption and accumulation will increase by 17.5 billion rubles or by 3.5 percent. Almost all national income growth is channeled into consumption. Housing conditions will be improved for approximately 10 million persons.

The humanism of the socialist way of life is manifested most vividly in a steady growth of public consumption funds. They will increase by 3.9 percent in 1985, totaling almost 146.5 billion rubles. It is planned to channel a substantial portion of these funds into social security and pensions, operation of preschool establishments, education, and medical care. Soviet citizens' health is guarded by 1.2 million physicians. Almost one out of three of the world's physicians is a citizen of our homeland.

And yet those who accuse us of a "lack of democracy," who purport to be "defenders of human rights" have in recent years undertaken a massive assault on the social achievements of the working people in their countries. Evidence of this is the recent White House decision to cut back social programs in Fiscal Year 1986 by 34 billion dollars. Reagan intends to solve the problem of rapid growth of the budget deficit, which threatens to exceed 220 billion dollars this year, not by cutting back on military expenditures (they will continue to grow) but by totally eliminating a number of programs which determine the welfare primarily of the poor segments of society. This applies first and foremost to financial assistance to the public transportation system, schools, municipalities, decreased appropriations for housing construction, creation of additional jobs, and assistance to the poor. In a country where in some cities the law prohibits allowing dogs and cats on the street in extremely cold weather, 4 million persons are without shelter.

In capitalist countries the right to a roof over one's head sometimes becomes a matter of life or death, while the right to labor becomes the right to die from hunger, cold and privation. All rights and freedoms in a bourgeois society are sacrificed to one thing: the right to private ownership. The position of the working people is steadily worsening. Food prices are steadily rising. In 1970, for example, a kilogram of white bread in the United States cost 54 cents, and $1.25 in 1980, a kilogram of beef cost $2.82 and 7 dollars respectively, a kilogram of butter cost $1.90 and 4 dollars respectively, and a liter of milk -- 30 and 55 cents. And today the prices of many market basket items and basic necessities are continuing to rise.

Our way of life is characterized by conscientious observance of social order and an uncompromising attitude toward antisocial phenomena and crime. The party and government call upon all Soviet citizens and all party and government agencies to engage in an uncompromising struggle against negative phenomena which unfortunately are still encountered in our society. As the Soviet society moves forward, the attitude toward the antipodes of the socialist way of life becomes increasingly less tolerant. A great deal is being done in this country in order fully to implement the party's program

demand that "in a society building communism there should be no place for law violations and crime."

As regards the capitalist countries, rampant violence and crime are an integral feature of the way of life of virtually every one of them, particularly the United States. And there are social reasons for this. For example, a mere 1 percent rise in unemployment increases the number of murders by 5.7 percent and the number of persons jailed for criminal offenses by 4 percent.

Soviet citizens are distinguished by Communist moral principles and moral purity, a high cultural and educational level. Marxism-Leninism constitutes the ideological foundation of the comprehensive development of working people and their assimilation of all areas of spiritual and intellectual culture. The Communist ideological outlook of the Soviet citizen and higher values form his convictions, his experiential posture, and are embodied in practical deeds.

The transition to universal secondary education has been completed in the Soviet Union. More than 100 million persons are encompassed by all forms of education in the USSR. We have approximately one and a half million scientific workers, that is, almost one out of every four worldwide. Allocations for education, science and culture in 1985 will increase to 49.2 billion rubles. Rise in the educational and cultural level as well as communist moral fiber of the Soviet citizen foster an increase in the defense might of the homeland of the October Revolution. For example, almost 100 percent of new conscripts entering the military are young people with a higher and secondary (complete or partial) education.

Things are different in the United States. In that country the rights and opportunities of working people to obtain an education are being increasingly infringed. College tuition has doubled in the last 10 years and now is running 5,000 dollars, and in many instances as much as 8,000 dollars per year. Bourgeois society, and particularly its military, is stricken by lack of moral fiber, apolitical attitudes, a lack of ethics and morality, and is distinguished by a low level of culture and education. A clear result of the crisis within the education system in the United States is the fact that today more than 25 million Americans are virtually unable to read and write.

Optimism, Soviet citizens' positive experiential posture, faith in man and his ability to do good, to remake the world according to the laws of justice and beauty are the most important advantages of our way of life. The Soviet people look to tomorrow with confidence, because they believe in the force of labor, in their country, in their party, with the organizational and indoctrinational activities of which we link all successes in the struggle to build communism.

Soviet optimism is also inherent in full measure in the fighting men of our glorious Air Forces as representatives of the working people. Grounds for optimism here include not only the objective conditions of our society but also specific military-professional factors: the just goal of defense of the

homeland, confidence in one's fellow soldiers, in the power and might of modern Soviet aircraft and weapons, and in victory over the enemy.

These are the most characteristic features of the two worlds and two ways of life. On the one hand a progressive, humane way of life, where concern for man is the highest value. On the other hand a reactionary, antihuman way of life, where capital is considered to be the highest value, while the working man is merely a means to achieve it. Practical, objective realities convincingly demonstrate the incomparable advantages of the former and the doomed nature of the latter. As a result it is not us but capitalism which must maneuver and camouflage itself, resort to wars and acts of terrorism, falsification and sabotage in order to hold back the inexorable onslaught of time, it was emphasized at the All-union scientific and practical conference entitled "Improvement Of Developed Socialism And the Party's Ideological Work In Light Of the Decisions Of the June (1983) CPSU Central Committee Plenum," held in December 1984. The general crisis of capitalism is not only an aggravation of its economic, social and political contradictions but also a spiritual -- ideological and moral -- crisis.

The Soviet way of life is constantly improving, evolving, and adding new content, increasingly more convincingly demonstrating our advantages, providing additional strength and resources in the struggle to build communism.

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LAND-OR-ABORT DECISION CAPABILITY AT IFR MINIMUMS

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 36-38

[Article, published under the heading "Flying and Psychology," by Honored Military Pilot USSR Col I. Ragulin and Doctor of Medical Science and Professor Col Med Serv V. Ponomarenko: "Landing at IFR Minimums"]

[Text] Modern airborne and ground navigation systems provide the capability to land aircraft in adverse weather with the ceiling below 100 meters and visibility less than 1 kilometer. In order to land an aircraft at IFR minimums, however, aircrews and ground personnel, who determine the quality of operation of ground and airborne radio navigation equipment, must solve two interrelated problems. The first is a technical problem. It involves ensuring the requisite equipment quality and reliability. The second is a psychological problem, which is defined by man's psychophysiological abilities and by the forming of new qualities and professional skills in the human operator.

It would seem that the first problem does not have any particular complications: the equipment should definitely be reliable and efficient, so that nobody will doubt the accuracy of the readings of the instruments used to land at IFR minimums. This is directly linked to the second problem, however, in which there are many questions pertaining to the psychological activity of the pilot and the specialist personnel handling and supporting flight operations.

As we know, maximum capabilities of an aircraft are usually defined as its existing as well as potential performance characteristics. When mastering a new aircraft, a pilot endeavors to wring out of it every capability engineered into its design. One of a pilot's most remarkable qualities consists precisely in this constant striving toward the new and unexplored, which excites the senses and the imagination, and which sometimes even involves risk. The pilot's labor, conscience, and courage constitute the master oscillator, as it were, powering the collective activeness of a given aviation collective when assimilating the new. And this is inevitably linked with creating a climate in the collective where the stated objective and personal striving by the pilot to achieve it become the common cause and idea of the collective.

The highest goal of the Soviet military pilot, his moral and professional ideal is to achieve the heights of expertise, in order skillfully to fight and defeat the enemies of the homeland in any and all conditions, even the most difficult. Herein lies the social essence of his activities.

It accumulates within itself, independent of him, the labor of all members of the aviation collective. Consequently ethics/morality on the part of our aviation personnel, being collective in nature, signifies that representatives of all aviation job categories, when assimilating something new, should make a contribution which would ensure both flight operations safety and continuous growth in the professional skill of the combat pilot. In addition, each member of the aviation collective, deeply cognizant of his high degree of responsibility for successful accomplishment of the common task, in conscientiously performing his job-related duties is improving himself both professionally and morally.

Practical experience indicates that success in accomplishing new job-related tasks, and in particular mastering landing at IFR minimums, is connected with the highest degree of responsibility on the part of each member of the aviation collective for the results of his labor and with psychological reworking and forming of a new attitude toward the task at hand. We shall cite the results of studies of the activities of pilots on flights with specially-equipped highly-maneuverable aircraft in ceiling and visibility conditions of 150 and 1,500, 100 and 1,000, 80 and 800 meters, in which test pilots, scientists, engineers, physicians, and psychologists took part. During the flights quality of piloting, level of nervous stress, and organization of distribution of attention among the instruments were recorded, and the specific features of the crew members' thought process were studied. Pilots from various line units were recruited for the experiments. We should note that the social features of aviation collectives, by the joint efforts of which the given problem was being solved, were of great importance.

From the professional and social point of view, flight operations at IFR minimums involve a sharp increase in mental and emotional stress on the part of all personnel involved, especially in those cases where the end results depend on close teamwork and cooperation. It has been noted, for example, that the slightest error on the part of any service involved has an immediate adverse effect on the performance of another. Flight operations in conditions of IFR minimums require not only mutual understanding between specialist personnel but also the readiness and willingness of each to take joint calculated risk and to perform in nonstandard situations. The fact is that deviations in change of weather conditions from 100 and 1,000 meters have a higher "cost" than, for example, from 200 and 2,000 meters, and there is a possibility of problem situations where a decision must be made at each command and control echelon. In this instance the term collective risk is defined as aware and deliberate professional preparedness to act in nonstandard, unplanned, but foreseen situations. In other words the pilot's risk is distributed among all personnel involved, and each involved supporting-service representative, handling flight operations in these conditions, should understand and sense the pilot's state and condition.

Flight operations specialist personnel are unfamiliar with how a lighted runway looks from the cockpit in fog, snow, and rain; or how the instrument needles behave when the power supply of ground radio beacon facilities falters; how the pilot's psychological state changes when the runway fails to appear after crossing the middle marker. As a result the pilot finds himself in a position where flight safety is his involvement alone.... Yes, virtually every first-class combat pilot has made landings below IFR minimums. And these landings have been successful. And everybody knows about it! Here we have one of the principal methodological requirements in mastering or assimilating new equipment or procedures, a requirement which should begin, with everybody and without exception, with forming new views, concepts, and level of thought process.

In a pilot a new professional view of the problem of IFR minimums should be formed from an analysis and evaluation of his capabilities and level of preparedness. Merely self-criticism alone is not sufficient for this. One needs good knowledge of the psychophysiology of instrument flying, psychology of flying an aircraft in autopilot and flight director modes, and behavior in nonstandard situations. This is a most serious problem. A commander's methodological maturity consists in the fact that, being profoundly aware of the difference in IFR minimums of 250 and 3,000 meters on the one hand and 100 and 1,000 meters on the other, in the physics of the phenomenon and in emotions, he is able to predict changes in a person's mental and emotional makeup. And this is very important for the pedagogic activities of commanders and political workers.

In order to understand the psychology of a pilot's activities, we shall endeavor with the aid of experimental data to respond to those fundamental questions which are advanced by practical experience and on which depends the directional thrust of flight training and indoctrination methods.

What aircraft flying mode should be the principal one in mastering the skill of landing at IFR minimums? Modern automatic control systems are capable of bringing an aircraft to the middle marker (80 and 800 meters). But what if the automatic control system fails? It would seem a simple matter: push the button and disengage the autopilot, except for the dampers. But what if the pilot has not shot a landing at the given ceiling and visibility? In that case emphasis is placed on aircraft position indicator instruments in selecting control mode. It is more complex, but it provides more accustomed information relative to position on glidepath.

Of course everybody understands that a pilot released to fly a training sortie should have the ability to fly a manual approach in case of an equipment problem. This is why the role of the automatic control system is sometimes underplayed in mastering landings at IFR minimums. In addition, studies have shown that psychologically pilots distrust automatic control systems (and not only due to inaccuracies in the operation of ground radio beacons). This has led to a situation where automatic control systems are employed for the most part in VFR conditions, while practice drills to determine failure and develop the ability to distinguish computer malfunction from servo or ground radio beacon malfunction are not conducted. Failure to utilize automatic mode has also been a disincentive for ground subunits to ensure reliable, uninterrupted

operation of instrument landing ground transmitters, while the air traffic control team has not been motivated to study the specific features of the pilot's altered procedures in automated flight.

As a result, as experiments have shown, pilots flying in automated mode experienced a high degree of emotional stress, and would manual-override every 5-10 seconds on final approach. Probability of determining onboard computer malfunctions did not exceed 0.6. Naturally in 40 percent of cases the instructor who had given the pilot a scenario instruction was forced to initiate a go-around due to the fact that the pilot failed to respond promptly. In addition, some methods recommendations in case of failure of any automatic control system component psychologically inclined the pilot to execute a missed approach. We must state that in experiments connected with simulating automatic control system malfunctions, a considerable difference was noted in pilots' actions pertaining to flying approach and landing sequences in relation to the nature of the scenario instruction. With an autopilot failure, for example, pilots flying an approach in flight director mode would complete the approach and landing with a probability of 0.924. Pilots who immediately shifted to position indicator mode, however, completed the approach and landing with a probability of 0.84. Equipment-malfunction scenario instructions were given while flying under the IFR hood [opaque windshield cover], after crossing the outer marker.

The comprehensive study included a teaching experiment to develop psychological trust in the automatic control system. At first pilots would fly in automatic mode in VFR conditions to a height of 100 meters without manually overriding. Automatic control system malfunctions would be reported by radio. At this stage they practiced monitoring automatic control system functioning by the position bars (on the NPP [pictorial-symbolic course indicator]), by flight director needle behavior (on the KPP [combined flight instrument]), and by the flight and navigation instruments. At this time they would be shown all kinds of automatic control system malfunctions. The aim was to teach the pilot to continue the approach and land. Toward this end he studied specific information indications of various system malfunctions and actively engaged in decision-making to choose mode of control: horizontal situation indicator, or flight director. In this manner pilots would learn to trust the automatic control system, gain psychological confidence in their own ability upon system failure, with ground specialist and air traffic control team personnel developing a stronger sense of responsibility for their own performance.

After this phase of practice drills, pilots would proceed to flying in automatic control system mode under the hood to a height of 80 meters. In these practice drills, in VFR conditions, based on the magnitude of error in keeping the aircraft on the localizer and glideslope after removing the hood, they would determine the accuracy of instrument landing ground transmitters and performance reliability of ground specialist personnel, formulating requirements on the quality of their work performance in IFR conditions, while flying personnel would gain confidence in reliability of automatic control systems in transition modes. The pilot would be faced with unexpected simulated malfunctions during flight, and he would see with his own eyes that one must constantly be alert and that one can determine the type of

malfunction and continue the landing approach with tower controller assistance. After 10-15 practice flights pilot psychological stress would diminish by 40 percent in comparison with a manual landing, time to determine malfunction decreased from 20-40 to 10-15 seconds, and probability of completing the approach and landing increased from 0.6 to 0.9. Thus as the experiments showed, automatic mode can and should be the principal mode in mastering approach procedures at IFR minimums. But a psychological restructuring is required thereby in the activities of all personnel involved in flight operations, since success depends on operational accuracy and reliability of airborne and ground radio gear and facilities as well as mutual understanding among all components of the control process.

Will piloting habits change in conditions with ceiling below 100 meters and visibility under 1 kilometer? Are special flying abilities needed for this? If so, what abilities? It has been determined that there exists a certain stereotype in thinking: a pilot sees nothing special about mastering approaches at IFR minimums, since all his actions and procedures remain fundamentally the same. The only thing that changes is the emotional background, which with good skills and procedural habits also has a certain inherent level. Studies have shown, however, that there are problems here. The fact is that from the standpoint of psychology instrument flying is an intellectual activity, not motor skills in controlling pointer movements. The pilot forms an image of the aircraft's position in space and attitude on the basis of information obtained from his instruments. This sensory-mental structure determines organization of distribution of attention among the instruments and the structure of anticipating control movements. In other words a pilot initially forms a goal-image toward which he strives and which constitutes for him an informational control program.

It follows from this that IFR flying cannot be reduced to holding gauge needles, since the flying operation includes knowledge, experience, and the mission task. The main content of mental activity during instrument flight consists primarily of continuous forming of the pilot's notion about his position in space. This is incorporated into the aircraft control process as an independent mental action and requires active, directed awareness to a continuous intellectual evaluation of the perceived flow of instrument information.

This theoretical premise has a practical directional thrust. It has been determined that during instrument flight, with the presently existing radio navigation equipment, incoming instrument information does not always equally satisfy the pilot as regards accuracy and ease of flying, as well as reliability of maintaining spatial orientation. Because of this at times, endeavoring to increase the accuracy of maintaining a given parameter, the pilot deprives himself of data on spatial position, and vice versa. Consequently processing of information remains in a conscious monitoring situation. In other words, during instrument flight the pilot, in the course of performing a complicated, partially automated control task, is also carrying out another purposeful action -- he is performing spatial orientation. This assumes particular significance in conditions of IFR minimums (100 and 1,000 meters or less). What must be taken into consideration from the standpoint of safety?

First and foremost the control mode. Flight director mode, for example, fundamentally alters the image of flight, simplifies it, reduces it to an image of indicator needles. The ease and comparatively high accuracy of a landing approach in this mode masks a lessening of monitoring of the aircraft's spatial position. In other words, while on glideslope the pilot devotes up to 80 percent of his time to monitoring the position of the flight-director system indicator needles which, incidentally, do not show the aircraft's actual spatial position. The fact is that while on glideslope pilots go as much as 10 seconds without checking altitude, up to 15 seconds for rate of descent, and 5-8 seconds for airspeed. And this is due not to a lack of skills but rather to the fact that a flight image formed by other instruments is replaced by an image of gauge needles. Concentration of attention on the flight-director system needles is so great that when a pitch indication failure was deliberately introduced into the artificial horizon, the pilot took 60-80 seconds to notice that the instrument had gone off scale. This is what change in the content of the image of flight signifies.

While on approach glidepath the pilot responds as many as 300 times to changes in the position of flight-director system needles, but he mentally remains passive, that is, functions like an automaton. In the absence of a warning indicating failure of the onboard computer, he proves to be an extremely ineffective link in the control system. Here too the main error of omission lies in teaching method, in training the pilot as an active backup to the automatic system. We shall state quite frankly that the instructor's hand all too rarely touches the malfunction simulation panel in the rear cockpit of the two-seater. And during training of the air traffic control team, rare is the commander who reminds them that in this mode ground specialist personnel should more alertly monitor holding to glideslope, while pilots must be taught cross-verification monitoring, that is, to conduct spatial orientation more actively.

The conduct of spatial orientation in conditions of IFR minimums is strongly affected by ceiling variability, its failure to agree with the forecast ceiling, and indeterminate horizontal visibility or visibility extending only to part of the runway length. This is directly reflected in the character of the pilot's activity both during flight in and emergence from clouds. Let us consider the facts.

The first thing that was discovered on experimental flights from the standpoint of psychoemotional reaction was the fact that the pilot sharply differentiates a boundary in weather conditions and organizes his attention distribution in conformity with these conditions. In what way do conditions of 100 and 1,000 and even 150 and 1,500 differ from prior-accustomed ceiling and visibility figures? First of all there is an increase in psychoemotional tension, independent of the level of flight automation (pulse rate ranges from 140 to 160). Maximum pulse rate occurs not in clouds but when emerging from them, that is, at the moment of decision-making regarding the landing. The next difference: organization of attention among the instruments depends directly on level of automation. This is particularly noticeable in the frequency with which the pilot's gaze leaves the instruments to look for ground reference points and in "redistribution of values" of instrument

information and space beyond the cockpit. Specifically: all pilots without exception take their gaze away from the instruments 5-10 seconds prior to anticipated breakout from the clouds. And the lower the cloud ceiling, the longer they fix their gaze outside the cockpit. This applies more to automatic control system mode and less to flight-director system mode. In addition, 15-20 seconds prior to the moment when the pilot actually sees the anticipated reference points, he concentrates 70-80 percent of his attention on course-and-heading instruments, regardless of control mode, to the detriment of altitude and airspeed instruments. And, what is particularly interesting, nobody flies visually after breaking out of the clouds. As a rule they fly 30 percent instrument and 70 percent visual. Shifting of instrument to visual orientation and back takes place every 2-3 seconds. The longest process of readaptation to visual flight takes place in flight-director control mode. In this mode the pilot makes the final decision to land or abort 5-7 seconds after establishing visual contact with the ground.

All these changes are entirely logical. The fact is that the initially formed target-image for landing in conditions of low ceiling and visibility is strongly supported by a special state of mind: anticipation of appearance of the runway. A cloud ceiling known in advance (reported by the weather briefer or tower controller) functions in the cerebral cortex as a focal point of heightened excitation. Precisely for this reason the pilot subconsciously switches his attention to beyond the cockpit with a change in cloud density, cloud light-and-shade, and increased flickering. Here everything is unstable and contradictory, since spatial orientation and smooth, precise flying are two mutually-significant tasks. Expecting the runway to appear at any second, however, the pilot excessively fixes his attention beyond the cockpit to the detriment of quality of flying. Once he has a definite idea of the location of the runway, he concentrates his attention primarily on heading information. As a result, if the mismatch error between the runway's actual and presumed location is considerable, as a rule the psychoemotional reaction is also considerable.

We should draw attention to the specific features of reaching the land-or-abort decision. The duration of this decision process, it has been determined, is linked by special principles to horizontal visibility. The decision to land or execute a missed approach in conditions where the ceiling is below 100 meters and visibility less than 1 kilometer, in spite of the fact that little time is available, is not a single-moment act of comparing an instrument analog and a visual picture. This is a process which is accompanied by a time interruption in monitoring flight parameters and transition to analysis of visual information on the flight from the ground, which demands particular attention on the part of the ATC team. The fact is that at IFR minimums the entire runway is not visible, that is, there does not take place in the pilot's thought process a swift changeover from a standard runway image to its visible portion.

As a rule during flight everything takes place much more simply than we have presented. In addition, flying personnel never give thought to this; everything proceeds as if automatically. But there is food for thought here; scrutiny from the outside is needed. A third question arises at this point.

In what consists the psychological component of a commander's methods work in training flying personnel to fly at IFR minimums? As was already stated, before training the pilot it is necessary to hone and adjust the "performance" of all members of the ground team, taking into account the psychological features of the pilot-soloist's performance. As for the pilot, it is very important to consider flying abilities and their interaction with habits and skill. Ability controls adaptation to changing new conditions and characterize an individual, his motives and attitudes. It is at this point that the commander should show his worth as a genuine educator, take note of his men's interest and help them reach a state of satisfactory performance, for the source of development of abilities lies here.

A fundamental question arises: how should existing comprehensive flight simulators (KTS) be used only from a psychological standpoint. One can successfully master flying in flight-director control mode on the KTS. The pilot learns not only to monitor the instrument needles but simultaneously to cross-monitor spatial position. It is very useful to practice transition modes from automatic control system to flight-director and horizontal situation indicator modes. In this way the pilot forms new skills and habits which will come in handy if this system fails. It is important to master flying skills in horizontal situation indicator mode, since conceptualization of one's position in space according to the horizontal situation indicator bars makes it possible to determine whether the automatic control system is operating correctly in autopilot or flight director mode. Unfortunately commercially-built simulators do not sufficiently fully simulate automatic control system malfunctions, and their indications do not fully correspond to those which actually occur in flight. Nor is the corresponding weather situation simulated, with the aid of which one could "fire up" the mental image which functions during actual flight. Therefore the forming of requisite specialized skills naturally continues to take place during actual flight.

We should note that practice approaches in the two-seater ending in a low pass over the runway unquestionably have their advantages (increased volume of practice approaches), but they also fail to form the principal abilities essential for successful mastery of flying at IFR minimums. These include volitional stability during the mental state of anticipating appearance of the runway, manifested in successful "splitting" of attention between flying the aircraft and performing spatial orientation; the ability to conduct alternating instrument and visual orientation without lessening completeness of mental reflection of the environment; capability immediately to make a land-or-abort decision with only part of the runway visible, without losing monitoring of flight parameters. This is helped by flying approaches under the hood to a height of 60-40 meters.

Mastering something new always ends with forming of new knowledge and correspondingly a new person, new commander psychology, and new societal values. All the above comprises merely information for discussion purposes. We hope that flying personnel and ground-team specialist personnel will contribute to the discussion.

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NEW BOOK PRESENTS CURRENT, FUTURE TRENDS IN AIRCRAFT DESIGN

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) p 39

[Review, published under the heading "New Books," of book "Aviatsiya nastoyashchego i budushchego" [Aviation of the Present and Future] by A. N. Ponomarev, Voyenizdat, Moscow, 1984, 256 pages, price 1 ruble 40 kopecks: "Airplanes of the Present and Future"]

[Text] The present stage in the development of aviation is characterized by extensive utilization of the achievements of the scientific and technological revolution, by continuous qualitative changes, and by increasing complexity of design and construction of aircraft, methods of aircraft utilization and modes of combat employment. Discoveries in the fields of physics and chemistry, mathematics and mechanics, materials science and electronics, cybernetics and technology are finding increasingly more extensive application in designing and building modern fixed-wing and rotary-wing aircraft.

A new book by Col Gen Avn A. Ponomarev entitled "Aviation of the Present and Future" presents a detailed analysis of modern aircraft and their development prospects in coming years. The author examines in detail problems of aerodynamics and aircraft design, powerplants and materials, equipment and weapons.

Substantial advances in the field of theoretical and experimental aerodynamics and development of effective numerical methods of computation and information processing have made it possible to find the most efficient aerodynamic aircraft shapes and successfully to resolve problems of powerplant employment, external weapon mounts and airframe, and to design aircraft with excellent aerodynamic characteristics.

One feature of the aerodynamic configurations of modern combat aircraft lies in the fact that they widely employ complex-shape wings with effective high-life devices, a sweep angle which can be changed during flight, as well as new controls and efficient blending of airframe, powerplant, and armament into a single, unified aerodynamic layout arrangement.

The external appearance of the new generation of combat aircraft was determined to a significant degree by transition to supersonic speeds. This

required a fundamental change in wing shape (it became thin, swept, low aspect ratio, with a sharp leading edge), fuselage (it became longer and assumed a tapered shape) and tail. With the appearance of supersonic aircraft there arose a sharp conflict between the trend toward increasing aircraft speed and the endeavor to maintain good performance characteristics under all flight conditions. It became obvious that with a fixed wing it was impossible to select aircraft shapes which would ensure excellent aerodynamic properties at high speed as well as good performance characteristics on takeoff and landing.

Only an aircraft capable of changing its wing geometry in flight, well adapting to specific flight conditions, is capable of possessing excellent aerodynamic and performance characteristics across a broad range of speeds and altitudes. Thus swing-wing aircraft were developed, as well as V/STOL aircraft. The author illustrates these modern aircraft development trends with specific examples of fighters, fighter-bombers, strategic bombers and military transport aircraft abroad.

But aviation is not standing still; it is constantly improving and developing. The author devotes considerable attention to research and development of future aircraft, especially high-maneuverability aircraft. The author examines the problems of designing and building aircraft with direct control of lift and yawing force, with an adaptive wing and swept wing, with supersonic cruising speed and maneuverability, with induced stability.

Of considerable interest are sections dealing with experimental, hypersonic aircraft and aerospace vehicles, cruise missiles and their launch platforms, future powerplants and aircraft materials, weapons aiming and navigation systems. On the basis of a profound analysis the author concludes that aircraft of the future will assume different external shapes and will be distinguished by improved aerodynamic and performance characteristics; they will incorporate new heat-resisting and composite materials and more sophisticated powerplants, equipment and armament.

The book is written in an interesting manner and is well illustrated. It presents a clear picture of the present state and basic trends in the evolution of aircraft and will be of use not only to Soviet Air Forces specialists but also to a broad readership with an interest in the development of Soviet and foreign aviation.

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AVIATION REGIMENT ENGINEER INCREASES AIR, GROUND PERSONNEL COMPETENCE

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 40-41

[Article, published under the heading "Marching in the Vanguard," by Col I. Svetlov: "High Standards"]

[Text] Maj V. Mikheyev made a notation in his notebook and turned to the lieutenant: "Tell me, please, your procedures in midair engine restarting."

The young pilot confidently proceeded to reply, from time to time switching on the appropriate toggle switches and circuit breakers.

"Hold it!" the engineer interrupted him. "The Midair Restart button must be held down longer." He fell silent for a second, and then asked another question: "What if pressure in the system drops one mark on the scale?"

"That is within allowable limits," the lieutenant replied.

"How about a drop of one more mark?"

The officer thought about it. The young pilots, clustered around the engineer, listened carefully to every word: an equipment procedures test was serious business.

"Point to the instruments and devices which are part of the dangerously low altitude recovery system."

The pilot arched his eyebrows in surprise. The question had evidently caught him napping.

"Where are they located?" the engineer pursued the question.

"Right here," the pilot pointed half-heartedly toward an access cover.

"Get a screwdriver and unbutton it...."

The way the engineer figured it was simple. Let a young pilot comprehend his mistake on the ground and learn the correct procedure. There is no time for

guesswork in the air. A grade of C in a test is a grade of D in the air, particularly for a fighter, in which one person comprises the entire aircrew: he is both pilot, navigator, flight engineer, and gunner-radio operator. If a difficult situation arises, he will have only himself to call upon.

Capt V. Mozalevskiy, a military pilot 1st class and an experienced combat pilot, who had repeatedly emerged victorious from the most varied situations, recently found himself precisely in such a situation. The pilots were practicing gunnery at ground targets. Aircraft were taking off one after the other. The airborne Mozalevskiy, receiving clearance from the range flight operations officer, performed the requisite maneuvers and put his fighter into a dive. His airspeed was increasing, and the ground was swiftly approaching closer with each passing second. Reference points and ground objects were also looming larger. He spotted the targets. Determining his target, Mozalevskiy focused his attention on the sight.

It was time to open fire, but the pilot delayed, endeavoring to aim as accurately as possible. He was about to push the firing button, when suddenly the control stick jerked and the aircraft abruptly changed altitude and heading. He began to see stars from the sudden increase in g-load. Fortunately Mozalevskiy did not lose his composure and brought his aircraft into level flight.

"This is 025! Mission aborted. Aircraft acting strangely," he reported to the flight operations officer.

Maj V. Mikheyev was one of the first to reach the pilot after landing. He questioned him about the aircraft's behavior and then proceeded to make a thorough inspection of the aircraft together with servicing group chief officer A. Kozhevnikov. A wealth of experience and a profound, comprehensive engineer analysis helped the officer quickly determine what had happened. It was ascertained that the equipment was in good working order; the pilot had been at fault, permitting the aircraft to descend over the range to an altitude below minimum safe altitude. The automated dangerously low altitude recovery system had kicked in at the proper time. Capt V. Mozalevskiy was unable to recognize system override and interpreted it as a control system malfunction.

That same day Vladimir Vladimirovich reported his conclusions in detail to the regimental senior brass.

"In my opinion we should hold additional drills with the pilots on cockpit equipment procedures in the air and on the ground prior to departure," he stated, "and at the same time work on the procedure of utilization of the aircraft's principal systems."

"I agree," the commanding officer approved. "Focus particular attention on the automated dangerously low altitude recovery system. The incident with Mozalevskiy has shown us that pilots on training sorties forget about it, since they seldom encounter this system in their flying."

Thus was born the idea of testing pilots on their knowledge of the aircraft and the operating procedures of its principal systems. On the preceding day Major Mikheyev had lectured the pilots on operation of the dangerously low altitude recovery system, the aircraft's behavior when it cut in, and on change in instrument readings. In other words the engineer presented the very essence of the question and gave the pilots that which they must remember in the air. His presentation was without question highly beneficial.

If one were to attempt to isolate Vladimir Vladimirovich's principal character trait, perhaps one might first mention the high standards he sets for himself and his subordinates. He likes order everywhere and in all things, and he always finishes a job once begun. He also demands this of others.

...It was a usual equipment servicing day. Sr Lt A. Vyacheslavov, squadron routine servicing and maintenance group chief, having completed inspection of one of an aircraft's automated systems, made a notation on his inspection sheet.

"Did you find anything?" Major Mikheyev asked the officer.

"I found a minor defect. Otherwise everything is fine."

"Is that correct?" Vladimir Vladimirovich asked himself, knowing that Vyacheslavov needed continuous oversight, since he was somewhat weak in theory. He recalled a recent incident where this officer, due to gaps in his knowledge, was unable correctly to organize the work activities of maintenance specialists. Then they proceeded to disassemble properly-working units and assemblies. And all this because Vyacheslavov had failed fully to determine the nature of the malfunction. The men lost a great deal of time, although it was a simple defect. The area-specializing engineer had to intervene....

"Unbutton the access covers; let's take another look," the engineer instructed.

The group chief shrugged his shoulders. One could sense that he was insulted at the engineer's request. When the inspection was completed, notations on two additional defects had been added to the inspection sheet.

"Here is the result," Major Mikheyev sternly remarked to the group chief.

Things did not end with this. The engineer assembled the specialization-area officers and critiqued in detail the error made by the group chief, once again reminding them where one should begin and how to proceed in the given instance.

Party member Mikheyev had worked hard to increase his knowledge. Flying an An-12 as flight technician specializing in airborne equipment, he had achieved considerable success. He was cited at meetings, and his know-how was publicized. But the young officer did not rest on his laurels; he sought to broaden and deepen his technical knowledgeability. Since he lacked higher education, after several years of active duty he applied for permission to enroll at the Riga Higher Military Aviation Engineering School imeni Yakov

Alksnis. His request was granted. Upon completing school he was assigned to a unit as an engineer in his area of specialization.

On the very first day Vladimir Vladimirovich toured the flight line, looked into the supply rooms and squadron service shacks. He was struck by a lack of proper order. Some of the officers and junior aviation specialists were dressed slovenly. The engineer then summoned the routine servicing and maintenance group chiefs and lectured them to the effect that modern aircraft equipment does not tolerate lack of organization or slackness.

"It is just one step from dirt on one's coveralls to dirt in the equipment," stressed Mikheyev, and added: "Tomorrow at formation I want to see everybody wearing clean coveralls. I shall personally inspect each work station to see if it is in good order."

Of course the young engineer realized that it is essential to campaign for cleanliness and order, but there were also somewhat more important items. In particular, he was concerned about how the provisions of guideline documents were being carried out in the process of aircraft maintenance. Of course the people in the unit had studied these documents prior to his arrival, and the men had taken tests and examinations. But Mikheyev decided to see that the requirements of the Aviation Engineer Service Regulations and other guideline documents became part of the very flesh and blood of each and every maintenance specialist.

After consulting with the commanding officer and his deputy for aviation engineer service, the engineer drew up a future work schedule for the squadrons' routine servicing and maintenance groups and the technical maintenance unit inspection and maintenance group not individually, as had been the practice in the past, but for the entire service as a whole. The fact is that the work schedule of the technical maintenance unit specialists sometimes "failed to jibe" with the regiment's intensive combat training schedule. The maintenance area was sometimes completely idle and at other times extremely busy -- on occasion aircraft would be standing practically cheek by jowl. This adversely affected the quality of the work.

The engineer devoted much attention to strengthening discipline and organization in the collective he headed. Now the maintenance specialists work in a smoothly coordinated manner.

"We endeavor to develop excellent professional qualities in every serviceman," explains Vladimir Vladimirovich. "The nature of combat operations today is such that any subunit may find itself separated from the main facilities. It is important that each and every technician or junior aviation specialist be able to perform the job duties of group chief and that every group chief be trained to the level of engineer. Toward this end we utilize tactical air exercises, when the squadrons are deployed to another airfield. We teach the group chiefs independently to set up operations to service fighters and turn them around on schedule for a subsequent sortie...."

Vladimir Vladimirovich explains persuasively, using specific examples, how he and his assistants make sure that every aviation squadron is fully supplied

with the requisite spare parts for field maintenance and repairs and that the men can function as if in combat, away from the main base.

"Exemplary in this," he states, "is the inspection and maintenance group headed by Captain Obodin. The group chief and his subordinate officers Mishchikhin, Zolotarev, and Kamynin give an example to other groups in being fully manned and equipped, in boosting proficiency ratings, and in improving the professional training of aviation personnel."

Pilots and technicians, commanders and subordinates respect Major Mikheyev for his unity of word and deed, his integrity, and for the high standards he places on himself and others. Unit headquarters party members have repeatedly elected him party buro member and deputy secretary of the primary party organization. Vladimir Vladimirovich served for quite some time as chairman of the officers' court of honor and member of the people's control committee. Party member Mikheyev holds classes for aircrews and technical personnel, presents lectures at the university of technical knowledge, and always thoroughly prepares for seminars on current Marxist-Leninist training topics. He enthusiastically supports any useful undertaking or valuable suggestion, although he knows full well that their practical adoption will require considerable additional time and effort.

...Once the regiment was aroused by the signal to assemble. The aviation personnel operated away from their main base, in adverse weather. But all targets were hit on the first pass, and the equipment performed smoothly and without malfunctions. Each squadron and the regiment's technical maintenance unit received high marks from the higher command. A good deal of the credit for this success went to the specialist personnel of the service headed by Maj V. Mikheyev.

This vanguard officer recently received a promotion.

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CARELESSNESS IN AIRCRAFT INSPECTION CREATES DANGEROUS IN-AIR SITUATION

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 42-43

[Article, published under the heading "The Reader Continues the Discussion," by Capt V. Chervinskiy, squadron deputy commander for aviation engineer service: "Skills of Foresight for the Aviation Engineer Service Specialist"]

[Text] Operation and maintenance of modern aircraft requires of every aviation engineer service specialist profound knowledge of theory, solid skills, flawless, precise actions, and scientific forecasting. Aircraft technicians and flight technical maintenance unit chiefs should not fail to recognize this, especially during a period of preparation for and servicing of flight operations.

Many years of personal work experience as well as analysis of the activities of technical personnel in various situations enable one to draw the following conclusion: to prevent possible errors during a period of intensive flight operations, it is necessary constantly to improve the work competence of aviation engineer service specialists and to carry out requisite organizational and technical measures in a prompt and timely manner.

In this connection I believe it would not be inappropriate to recall a thought contained in an article by Maj Gen Avn A. Grishin entitled "Squadron Engineer, What Should He Be?" (AVIATSIYA I KOSMONAVTIKA, No 11, 1984), about how today immeasurably higher demands are placed on those who directly organize servicing of modern aircraft systems and on the level of their professional knowledge, skills, and quality of technical training and work performance. And success depends in large measure on the degree of competence and smooth coordination with which they perform routine servicing and maintenance on the equipment and weapons in their care and on their degree of discipline and organization.

The validity of this notion has been proven by practical experience. As regards the conditions of flight-related activities in our unit, however, one must note that in spite of good performance marks in combat training, some flight technical maintenance unit chiefs at times are less demanding on aircraft technicians, relying on their experience and know-how, and

consequently they less closely monitor the quality of fighter preflight preparation.

In my opinion the squadron deputy commander for aviation engineer service should also in this area display the qualities discussed in A. Grishin's article: organizer abilities, initiative and businesslike efficiency, and the ability to adjust the aviation engineer service components in such a manner that they are of equal strength and dependably ensure high-quality, orderly work performance by aviation personnel.

Upon reading the article, I decided to relate what in my opinion is a typical incident which took place in our subunit. It took place quite some time ago, I must admit, but it served as a good lesson for me, as a deputy commander for aviation engineer service, in the area of improving organization of work activities on aircraft equipment, as well as improvement of performance monitoring of all aviation engineer service specialists.

...Military pilot-expert marksman officer I. Kolisnichenko was returning to the field after completing a practice flight in the advanced maneuvers area. Nothing seemed to presage danger. Kolisnichenko had already radioed the tower that he was on final. Suddenly as he was approaching a reference point the officer noted that a light on the central annunciator panel had begun flashing. This meant that there was something abnormal about the functioning of one of the aircraft's systems. But which one?

A brief glance at the display panel was sufficient for the experienced combat pilot to register that the Check Booster System Pressure warning light was on. The pressure gauge also showed a rapid drop in booster system pressure. Within a few seconds it was considerably below the minimum safe level. The situation was serious.

We should note that the pilot responded coolly, competently, and skillfully to the situation. Reporting the problem to the tower, Kolisnichenko immediately lowered his gear, as emergency procedures require, and also performed other operations appropriate to the given situation. We should note that since the pressure drop in the booster hydraulic system occurred on landing approach, the wings were already set to the proper sweep angle. Within a few minutes the combat aircraft was safely on the ground.

Aviation engineer service specialists naturally proceeded to determine what had happened and why such a serious mishap-threatening malfunction had occurred. They were particularly interested in questioning aircraft technician Sr Lt V. Manayev in this regard. The puzzled Manayev made a helpless gesture. Flight technical maintenance unit chief Capt A. Yefimov was also unable to state what had caused the pressure drop.

Yefimov and I then proceeded to inspect the aircraft. The first thing we noted was a large quantity of hydraulic fluid on the left side of the fuselage. Removing an engine inspection cover, we discovered that the booster system teflon hydraulic fluid injection hose running from the pump was damaged. We then asked ourselves how it could happen that teflon hose damage had occurred in a conspicuous location, which would seem to be constantly

under the vigilant eye of the aircraft technician? The thought that Senior Lieutenant Manayev had been less than conscientious involuntarily came to us. But this officer had the reputation of being a thoughtful and competent specialist. There had been no prior complaints against him regarding quality of equipment inspection and maintenance. Could this be an instance of negligence on the officer's part? We decided to check the mechanic's log. The fact is that on the previous day I had ordered that specifically this assembly be inspected on all aircraft. There was an entry to that effect in the maintenance log. There were two signatures under the entry: that of the aircraft technician and the flight technical maintenance unit chief, who had verified that the inspection had been made.

In the meantime the teflon hose was removed, and maintenance specialists carefully examined it in the regimental technical maintenance unit. It was ascertained that the cause of failure was abrasive wear of the metal braiding, and subsequently wear on the flexible hose proper, against an adjacent line in the process of hydraulic pump operation. This meant that the clearance between hose and line was less than specified in the manual, which resulted in them coming into contact during flight when the hydraulic pump was operating.

The fact that aircraft technician Senior Lieutenant Manayev had in fact been negligent in performing the specific inspection also immediately became obvious at the time. And what about the flight technical maintenance unit chief? It was ascertained that Captain Yefimov, relying on the technician's experience, failed to check up on his inspection.

"The clearance between line and hose was as specified," the aircraft technician insisted, trying to deny any guilt. "I myself checked it during the special inspection."

I had no reason not to believe the officer. That was not the point: how did he check it? Manayev was unable to reply to the question of whether the clearance was in conformity with the maintenance specification, since he had not actually taken any measurement but had eyeballed the clearance.

At this point I believe that we should mention an important quality which is essential to today's aviation engineer service specialist, who deals with highly complex aircraft systems -- the ability to foresee the state of equipment in various conditions of operation and possible problems with the operation of a given assembly or system.

In this instance the experienced aircraft technician had been betrayed by his senses. He had failed to attach importance to the lessened clearance and had failed to consider the possible consequences of this during equipment operation in various conditions -- during high load factors in flight, with an increase in hydraulic fluid pressure, etc. But practical operation and maintenance of modern aircraft urgently demands of technical personnel an innovative approach to their servicing and maintenance, broad knowledgeability and an analytical thought process, as well as essentially the ability to forecast the condition of equipment. I feel with certitude that today this quality should be possessed by everybody involved in servicing and maintaining modern combat aircraft, from the regimental specialization-area engineer and

squadron deputy commander for aviation engineer service to the aircraft technician. In my opinion scientific foresight is an essential condition for engineers and technicians to do their job.

The incident I have related was analyzed in detail with aircrews and technician personnel. Utilizing diagrams and charts specially prepared for the occasion, a comprehensive analysis was made of the technician's error during the special aircraft inspection, as well as the flight technical maintenance unit chief's mistake in organizing performance verification. A practice drill was then conducted with aircraft technicians on specific inspection of hydraulic system teflon hoses, and a class was conducted for flight technical maintenance unit and servicing and maintenance group chiefs on carrying out the mandatory list of operations without which an aircraft may not be released for flight operations. In addition, we performed a specific inspection on all aircraft to check the condition of the hydraulic system teflon hoses, since checking their operation is one of the key items of modern fighter maintenance. Currently in scheduling specific-purpose inspections we regularly specify checking the operation of the powerplant and all aircraft systems.

The critique and analysis of the potential air-mishap situation served as an object lesson for all. It taught aircraft technician Senior Lieutenant Manayev that in performing any operation on an aircraft one must approach the job not mechanically but with thought and analysis, ready to prevent any possible problems in the operation of assemblies and systems. Flight technical maintenance unit chief Captain Yefimov learned that when performing an operation-by-operation verification it is necessary closely to monitor the actions of one's subordinates, to teach them proficient servicing and maintenance of aircraft, to have the ability promptly to notice even the slightest deviations from the requirements of guideline documents and, on this basis, to develop excellent professional qualities in them.

As head of the squadron aviation engineer service, I also drew a conclusion for myself. I became convinced even more strongly that in organizing work activities for aviation engineer service specialists, at the stage of assigning tasks pertaining to immediate preparations for an equipment servicing day it is important to focus their attention on the specific features of performance of each operation, to teach aircraft technicians and flight technical maintenance unit chiefs to consider the entirety of the processes taking place within the equipment, and to have the ability to analyze these processes from a scientific standpoint in order to prevent potential malfunctions.

Returning to the article "Squadron Engineer, What Should He Be?", I should like to state that it provided me considerable food for thought. In particular, it provoked reflection on what should be done and how it should be done to achieve further improvement in the quality of servicing and maintenance of combat aircraft, their systems, components and assemblies. In the final analysis this is a guarantee of a high degree of combat readiness for the unit as a whole. I would like to know the opinion of my colleagues --

squadron deputy commanders for aviation engineer service -- on the question of what qualities today's squadron engineer should possess. I am certain that this would benefit the common cause.

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WARTIME CONTRIBUTION OF MILITARY MEDICAL PERSONNEL DETAILED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 4, Apr 85 (signed to press 5 Mar 84) pp 44-45

[Article by Doctor of Medical Sciences and Professor Lt Gen Med Serv N. Rudnyy: "Exploits by Aviation Medical Personnel"]

[Text] Aleksey Mares'yev, Zakhar Sorokin.... Who is unfamiliar with the names of these intrepid fighter pilots and Heroes of the Soviet Union? Having lost their legs in fierce battles with the fascist invaders, after their convalescence they returned to active duty as pilots and continued flying combat sorties and winning new victories over the enemy. Naturally credit in this noble deed goes to the pilots themselves, their will, their passionate devotion to the socialist homeland, faithfulness to military duty, and burning hatred toward the enemy.

But aviation medical personnel also did a great deal toward returning them to active duty. In the harsh war years they fought a stubborn struggle to save aviators' lives, which at times hung on a thread. They included aviation unit physicians, paramedics, and nurses at medical aid stations and airfield service battalion (BAO) hospitals, as well as military aviation hospital medical personnel. A high degree of operational efficiency and professional expertise were demanded of them.

During the Great Patriotic War I served in a combat fighter regiment which was defending the skies over Karelia and which took part in the Svir-Petrozavodsk and Petsamo-Kirkenes offensive operations. The climate there was harsh. It is difficult for man to become accustomed to it. It was also difficult for us military medical personnel. We had to consider many factors in the activities of aircrews, engineer and technician personnel in that environment. Nor did people feel up to snuff in conditions of the long polar night. But during that period pilots, engineers, technicians, and junior aviation specialists were working selflessly and at full effort. We aviation medical personnel closely monitored the health of aviation personnel. The absence of sun, warmth, and vitamin deficiency weakened the organism and promoted the development of various ailments. This threatened serious consequences, putting people out of commission. There were no fewer problems in the summer, when the sun never set. A sharp increase in the intensity of combat missions led to fatigue on the part of flying personnel and ground crews.

...Regimental headquarters, the command post, dugout shelters for flying personnel, and the mess hall were situated near the airfield. Our entire medical service was in a BAO, which was deployed at a distance of 3-4 kilometers from the field. This created certain inconveniences, and pilots visited us rarely, only in an emergency.

Naturally the regiments' doctors were in a very difficult situation without an airfield medical aid station. We had no facility where we could examine and immediately give medical assistance to aviation personnel. Vigorous measures had to be taken to rectify the situation.

I recall a combat-zone airfield where, soon after our arrival, they built a small dugout shelter near headquarters. It contained all the essentials to render first aid to aviation personnel. It became easier to perform medical examinations, to stand duty during flight operations, to give inoculations, and to receive patients.

It was necessary to perform a large volume of the most diversified measures connected with guarding the health of personnel and maintaining a high level of fighting efficiency, especially for pilots.

The most important thing during this period was to establish correct relationships with the regiment's pilots. We should emphasize that most of them were in robust health and did not like to complain when they were not feeling well. We had to keep a very close watch on the aviators' health in order to prevent the development of fatigue or any physical ailment, to warn them in a timely manner against any threatening hazard, and to do everything to keep a man fit for duty....

During active combat operations our fighter pilots would fly 5-7 combat missions daily, and sometimes more. The intensive situation placed considerable physical and psychological stresses on flying personnel. This obliged the doctors to pay maximum attention to the men.

I should note that during that period there were young doctors among the aviation medical personnel, doctors who not only lacked sufficient work experience but also who possessed poor knowledge of the specific features of supporting air combat operations and did not possess an adequate mastery of the methodology of examining and passing aircrews for flying duty. Regular periodic certification examinations of aviators by flight surgeon medical boards were not conducted during the initial period of the war. Therefore in order to reestablish the system of dynamic monitoring of their state of health it was necessary to seek forms of contact between doctors and pilots, including interviews and examinations, which would provide knowledge of the state of health, individual peculiarities and stamina of each pilot and his capabilities to perform a combat mission.

The matter of forming a flight surgeon medical board was raised in order to answer in a more qualified manner the question of fitness for flying duty on the part of a given aviator, especially new replacements.

For example, a VLK [Flight Surgeon Medical Board], based at the Murmansk Municipal Outpatient Clinic, was formed for this purpose in the 1st Composite Aviation Division. When necessary flying personnel of the Leningrad Front would be examined and certified by doctors of the 2nd Department of the Front Flight Surgeon Medical Board in Leningrad. As regards pilots in military hospitals, according to instructions by the Main Military Medical Directorate (GVSU), prior to hospital release they would be given a thorough medical examination to determine fitness for flight duty.

A particularly heavy combat workload rested on the shoulders of flying personnel of the air forces of the 14th Army when the enemy, attempting to capture Murmansk and sever the Murmansk rail line, possessed superiority in air strength. Operating in the difficult conditions of the Arctic day and aggressive enemy air combat actions, the army's flight personnel would have to remain for several days and nights running in a status of readiness to take to the air immediately and frequently to fight intensive air engagements. The excessive sortie rate naturally soon led to an increase in the number of cases of physical exhaustion.

The excessive nervous and emotional tension and heavy physical work load affected health. Some pilots developed headaches, general debility, and insomnia. The most typical medical problems suffered by flight personnel included functional disturbances of the nervous system (neurasthenia, vegetative neuroses, etc).

Since everything was subordinated to the interests of combat, any extensive measures to limit the sortie rate were out of the question. Therefore the medical service sought to create conditions, to the extent that the situation at the front permitted, for normal rest and relaxation of psychological tension. Toward this end flight surgeons set up with BAO medical service manpower and resources rest houses and night sanatoria accommodating from 5 to 35 persons, where pilots were given the opportunity to rest for a period of from 2 to 5 days.

Such rest houses and night sanatoria played a positive role. But they were not always highly effective, since they were located close to combat-zone airfields, and when the necessity arose air unit command authorities would frequently recall pilots on a rest regimen. Therefore it was necessary to propose to the command authorities and medical service of aviation large strategic formations that special rest houses be set up at some distance from the airfields. Such rest houses soon went into operation in the northwestern sector. They were used by several units and combined units. Their staff personnel were maintained by local health service agencies. In addition, the Air Forces command authorities assigned to each rest house a doctor and a person from the quartermaster service. Unit commanders would send flying personnel to rest houses at the request of aviation regiment senior flight surgeons. A total of 1,065 persons visited rest houses of two fronts -- the Leningrad and Karelian -- in less than a four-month period during the war.

We should also like to draw attention to the following fact. From the very commencement of combat operations the Air Forces medical service took vigorous measures to support high-altitude and night missions. Particular attention

was also focused on ensuring a proper diet, adequate to restore expended energy and to increase the resistance of aircrew personnel to the adverse effects of various factors of flight, including altitude. Separate rooms were set up and four meals a day were provided for those who flew at night. Alongside measures to provide proper daily routine and rest for flying personnel, a certain role was also played by medicinal agents, including so-called stimulants, the beneficial effect of which on one's feeling of physical well-being and fitness for work was noted time and again by aviators.

The medical service prepared and implemented a number of measures to improve organization of flying personnel meal service and to improve quality of meals, for the purpose of restoring health and maintaining flying personnel in a constant state of readiness to perform difficult combat missions, with the active participation of military councils, political agencies, and party organizations. For example, by order of the people's commissar of defense USSR dated 30 July 1941, a special fifth, augmented and improved dietary standard was adopted for all pilots and other aircrew members. Aviation medical personnel also attached great importance to ensuring adequate dietary vitamin intake, which was particularly important in conditions of the Far North.

We should like to discuss in particular medical monitoring of state of health. In constant contact with flying personnel at the airfield both prior to and after an aircrew returned from a combat mission, in quarters, at the mess hall, during preflight examinations and interviews, during observation and examination at BAO night sanatoria and rest houses, aviation medical personnel would promptly note the slightest deviations in the state of health of combat pilots. They devised and implemented a number of prophylactic measures. Frequently they would be called upon to perform their duties while under bomb, artillery and mortar attack. All this demanded enormous labor, great self-sacrifice and courage. But our outstanding physicians, paramedics, and nurses performed their noble and honorable mission fearlessly and with a great deal of enthusiasm, which earned them enormous respect on the part of aviation personnel.

I still recall the following incident. Once the adjutant of one of our squadrons, Sr Lt Semen Tararyko, was wounded in an aerial engagement. Medical personnel did everything possible to enable him to return to flying duty. Their labor and skill were crowned with success. At first Tararyko was authorized to fly the U-2 and R-5, but the officer was insistent: give me a fighter! Yielding to his persistent requests, the commanding officer was about to give him permission. A follow-up medical examination revealed, however, that the injury he had suffered diminished his ability to tolerate high altitudes. He could not be permitted to climb to high altitude -- he might lose consciousness and perish. It cost me a great deal of effort to convince this pilot that his demand was premature and that substantial curative treatment was needed.

Squadron deputy commander Capt K. Khorokhordin was highly irritable. It was necessary thoroughly to examine the case and determine the actual cause. Soon the doctors established that the pilot was sleeping poorly due to an excessive work load: consumed by a burning hatred toward the enemy, he was ready and

willing to go out on combat missions, at any time and with any frequency. It became necessary to limit for a certain time the number of missions flown by Khorokhordin, in order to enable him to get proper rest....

During the war medical posts were established at airfields, operated by aviation-technical units medical service personnel and resources, when combat missions were being flown. Personnel included paramedics, who would provide first-aid medical assistance. An ambulance or specially adapted truck would be placed at the disposal of a medical post for evacuation of sick or injured aviation personnel to a medical aid station or infirmary.

Paramedic assistance included stopping bleeding, easing the patient's state at a moment of acute complications connected with the injury, preventing secondary infection of a wound, preventing and lessening the effects of shock. Its specific content would be determined by the nature of the injury, the condition of the wounded, and by those conditions in which medical personnel were aiding a casualty.

First aid would also be given to aircrews at the site of a forced landing away from an airfield, and therefore search parties would include medical personnel.

The location of medical aid stations close to an airfield was convenient for aviation medical personnel. They would be able to render necessary medical assistance to wounded aviators within an optimal time, within 20-30 minutes.

Doctor-rendered medical first aid involved specific tasks. They included preventing development of infection in wounds, prevention of and measures to combat shock, corrective response to life-threatening loss of blood and impairment of functions of vitally important systems, and preparation of the sick and wounded for subsequent evacuation.

During the war years airfield medical aid stations (PMA) performed a large volume of treatment and prevention work. Thousands of sick and wounded passed through them. Following performance of medical measures at these aid stations, sick and wounded would be evacuated either to a line-unit infirmary or else to ground forces medical establishments or army aviation hospitals. We should mention in particular the important role in rendering skilled medical assistance to the wounded by army aviation hospitals, which were organized in 1944. Non-T/O field surgical hospitals were operating in 1942-1943 in a number of large strategic formations.

We also devoted serious attention to the health of engineering-technical personnel: technicians, airframe and powerplant mechanics. Tireless workers of combat-zone airfields, they rightfully share the fame and victory of our intrepid fliers. In all weather, in the heat and cold, in the rain and snow, lacking creature comforts and regular meals, they would frequently work at the airfields night and day, readying aircraft for combat sorties, repairing and returning them to service. Each man did the work of three. This was demanded by the situation, by the intensity of the struggle against the fascist invaders.

The months of June, July, and August were particularly difficult ones for engineer-technical personnel in the Arctic, for the sun would remain above the horizon around the clock, with continuous combat flight operations. I can still see their work-weary faces, weathered by wind and cold, and their rough, callused hands. But the technicians, airframe and powerplant mechanics, and other ground specialist personnel would report for medical examination placidly and would voice no complaints.

Deterioration of the health of airfield workers would most frequently occur due to vitamin deficiency in winter. There were cases of night blindness and initial symptoms of scurvy. There was no time to be lost. We got together with food service supervisors and thought about how to improve the men's diet and increase the caloric content of their meals, for a deficiency of vitamins in the organism was also an enemy undermining the regiment's combat readiness. And although our capabilities were modest indeed, we did succeed in doing something about it. Vitamins A and C were particularly needed. We organized gathering of berries and the preparation of infusions made with conifer needles. Subsequently persons with pronounced symptoms of ailments were sent away for treatment, and the state of health of the others was closely monitored. The situation improved thanks to the measures which had been taken. We were able to keep many people fit for duty, and this is the highest praise for the selfless labor of aviation medical personnel.

The harsh years of the Great Patriotic War were also a grave test for military physicians. They made their contribution to the victory of 1945, generously giving the warmth of their hearts and the skill of their able hands to the cause of preserving and restoring the health of our servicemen. Their deeds excite admiration.

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ADVANCED AIRCRAFT WING AERODYNAMICS REVIEWED

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[Article, published under the heading "Practical Aerodynamics for the Pilot," by Doctor of Technical Sciences and Professor Maj Gen Avn M. Nisht: "With a Wing of Complex Shape"]

[Text] Analysis of the aerodynamic properties of wings across a broad range of Mach numbers indicates that for each range of speeds (subsonic, transonic, supersonic) there is an optimal wing configuration which provides the best performance characteristics, and particularly the greatest aerodynamic quality. Wing shape determines the character of airflow at various Mach numbers and, consequently, the forces and moments which arise.

At low subsonic speeds, and at takeoff and landing speeds in particular, a wing with a high aspect ratio and low sweep angle, or a fat-section unswept wing with a rounded leading edge (to obtain suction force on the leading edge) is a good configuration. With a shift to transonic speeds there arises additional, so-called wave drag. To reduce this drag one must reduce the aspect ratio and relative thickness of the wing, sweep it, while leaving the leading edge rounded to preserve the suction force. Advantageous at supersonic speeds are low aspect-ratio, highly-swept wings with a thin profile and sharp leading edge (to reduce wave drag). Thus a specific wing shape is needed for each Mach number in order to obtain optimal properties from the standpoint of aerodynamics.

Flying across a broad range of airspeeds, from low subsonic on takeoff and landing to high supersonic in maximum-performance situations, is supported to a certain degree by a variable-sweep wing. Such a wing has a low aspect-ratio and highly-swept wing root and a movable outer wing, which during flight can swing on a vertical axis. When the outer wing swings rearward, the sweep angle increases, with a decrease in wingspan, wing area, aspect ratio and relative thickness, with the opposite produced when it swings forward. The relative thickness of the swinging section changes due to change in its chords, while wing area decreases due to the fact that the swinging section enters the fixed root. Consequently by swinging the outer section rearward, the thick, unswept, high aspect-ratio wing, optimal for slow flying speeds, is transformed into a thin, low aspect-ratio swept wing, advantageous at high

supersonic speeds. In other words, wing shape is optimized for specific Mach numbers.

A variable-geometry wing has one important weakness, however: due to the presence of a swing assembly, it is complex in design and construction, insufficiently rigid, and comparatively heavy. Therefore recently there has been noted a return in fighter design to a fixed wing of complex planform -- a "hybrid" wing. To a certain degree it harmoniously combines the properties of subsonic and supersonic wings.

The main thing which differentiates variable-geometry wings and complex planform wings is the so-called "naplyv" [inboard leading-edge extension], that is, a projecting forward part of the wing, with a high sweep angle and extremely low aspect ratio in comparison with the outboard sections. This inboard leading-edge extension plays a stabilizing role in providing the requisite aerodynamic characteristics to the wing and aircraft across a broad range of subsonic, transonic, and supersonic speeds. Its extremely low aspect ratio and high angle of sweep lead to an increase in the effective (average) sweep of the wing as a whole, as well as to a decrease in its aspect ratio and relative thickness (by an increase in the inboard leading-edge extension chords). This explains the lesser growth of wave drag and smaller rearward displacement of the aerodynamic center upon transitioning from subsonic to supersonic speeds.

In addition, a "return" of the aerodynamic center to its subsonic location is sometimes observed on aircraft with complex-planform wing at high supersonic speeds with an increase in Mach number. This is due to the fact that the inboard leading-edge extension, with a low aspect ratio and high angle of sweep, at subsonic speeds generates comparatively little lift, and the location of the aerodynamic center is determined primarily by the outboard wing section. The inboard leading-edge extension's role in generating lift increases at high supersonic speeds. Since it is positioned forward of the main part of the wing, at a Mach umber greater than 1 the aerodynamic center shifts forward.

Airflow past a complex-planform wing at positive angle of attack alpha runs not only across the lateral edges of the outer sections (which occurs on any wing of finite span), but also across the skewed leading edges of the inboard extension, with flow separation occurring. Not only wingtip vortices are formed, but also leading-edge vortices on the inboard extension. When alpha exceeds 0 they pass over the wing, near the aircraft's tail, and sometimes extend far behind it, forming wake turbulence.

Figure 1 shows a field of transverse or lateral velocities in a section to the rear of the trailing edge of a starboard wing of complex planform at an angle of attack of alpha=15 degrees. It is apparent that the inboard extension leading-edge vortex is stronger than the wingtip vortex and induces substantial upwash, downwash, and sidewash. Leading-edge vortices exert both a positive and negative effect on an aircraft's aerodynamic characteristics.

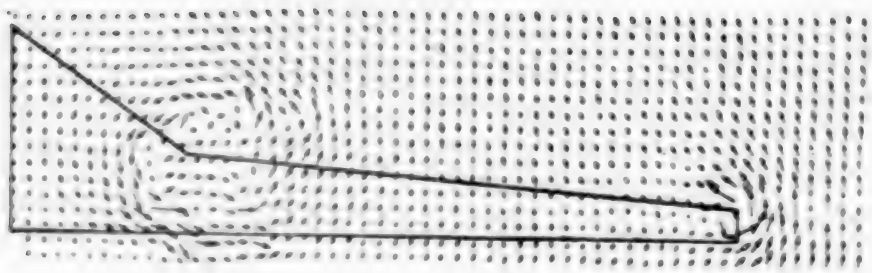

Figure 1. Field of lateral velocities aft of a complex-planform wing.

There occurs in the vortices forming over the wing a significant thinning of flow, which exerts a suction effect, and wing lift increases (so-called "useful separation" of flow). The greater the angle of attack, the greater the increase in lift (Figure 1 on back cover) [not reproduced].

Strong inboard-extension leading-edge vortices perform the function of unique barriers or partitions on the upper surface of the wing. Wingtip flow separation, typical for conventional swept wings, is practically eliminated, and critical angle of attack alpha-cr and lift coefficient Cy-max increase. The comparatively small sweep angle of the outboard wing section and absence of wingtip flow separation increase the effectiveness of roll control (ailerons or spoilers) and high-lift (flaps) devices.

Vortices can proceed from the leading edges of the inboard extension rearward, passing close to the tail, and substantially altering its flow pattern, worsening the aircraft's stability and controllability characteristics. For example, although critical angle of attack is fairly large, a tendency toward "flattening out" may appear in moment characteristic m-z(alpha) in the flying range of angles of attack, causing a worsening of the aircraft's pitch stability (Figure 2 on back cover) [not reproduced]. It is connected with a forward shifting of the aircraft's aerodynamic center (Figure 3 on back cover) [not reproduced]. In aircraft with conventional swept wings this is caused by wingtip flow separation.

Figure 2 contains a photograph of the airflow spectrum of an aircraft model with a variable-geometry wing in a wind tunnel at an angle of attack of alpha=20 degrees. The regular linear arrangement of the threads indicates the absence of flow separation from the surface. Consequently forward displacement of the aerodynamic center at alpha~20 (Figure 3 on back cover) is due to other causes, namely the effect of leading-edge vortices from the inboard extension).

First of all, these vortices alter the direction of airflow wash on the horizontal tail. With an increase in angle of attack intensity of vortices increases, but at the same time they rise somewhat, and the zone of maximum wash moves away from the horizontal tail. Therefore with an increase in angle

of attack the airflow wash angle initially increases, reaches a maximum, and subsequently decreases. As studies indicate, maximum wash occurs in a range of angles of attack corresponding to "flattening out" of moment characteristic m-z(alpha).

Figure 2. Photograph of airflow spectrum on an aircraft model with a variable-geometry wing in a wind tunnel.

Secondly, leading-edge vortices, passing over the inboard extension and exerting a suction effect on it, shift the aerodynamic center forward, since the inboard leading-edge extension is positioned forward of the aircraft's center of gravity. With an increase in angle of attack, on the one hand intensity of vortices increases, while on the other hand they move away from the surface of the inboard leading-edge extension, and their suction effect on the wing decreases. As a result a forward shifting of the aerodynamic center is observed within a certain range of angles of attack.

It follows from the above-described physical picture of wing airflow that in order to reduce the adverse effect of leading-edge vortices on an aircraft's longitudinal stability, it would be advisable to place the horizontal tail below the wing plane.

In addition, vortices from the inboard leading-edge extension worsen an aircraft's directional stability at high angles of attack (Figure 4 on back cover) [not reproduced]. For example, coefficient M-y-beta, which

characterizes directional stability, initially decreases in absolute magnitude and subsequently reverses sign.

As we know, on all aircraft directional stability decreases with an increase in angle of attack. In the first place, with an increase in angle of attack the vertical tail inclines rearward, its effective sweep angle increases, with a decrease in lifting properties and lateral force during a slip. Secondly, it is shaded by the fuselage and wing located forward, especially by the wing's inboard leading-edge extension, that is, there occurs intensification of flow deceleration by these parts of the aircraft. On aircraft with inboard leading-edge extensions, these factors are joined by the adverse effect of vortices.

The point is that the vertical tail is positioned between these vortices. In the absence of a slip (beta=0), the left and right vortices propagate symmetrically, and their effect on the vertical tail is mutually compensated.

In a slip (beta is not equal to 0) the vertical tail is in the zone of one of the vortices (Figure 3), and the perturbed velocity field around it proves to be asymmetrical. Sidewashes increase, and lateral force decreases. With an increase in angle of attack intensity of vortices and wash increase and lateral force Z-v.o may reverse sign. Total loss of vertical tail effectiveness occurs, and a destabilizing yawing moment occurs. Roll stability also worsens. As a result the aircraft vigorously slips (increases slip) and may stall.

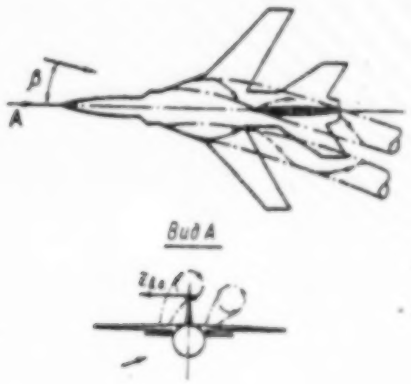

Figure 3. Diagram of interaction of leading-edge vortices with single vertical tail.

Employment of a twin vertical tail is an effective means of increasing the directional stability of an aircraft with a complex-planform wing at high angles of attack (Figure 4). In a slip one vertical tail enters the vortex flow zone, sidewash increases on it and its effectiveness diminishes, while the other tail leaves the zone and its effectiveness does not diminish. As a result the aircraft maintains directional stability up to high angles of attack.

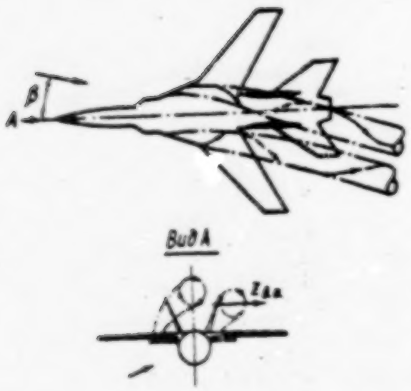

Figure 4. Diagram of interaction of leading-edge vortices with a twin tail.

Employment of automatic cross-linkages is a less radical but sufficiently effective means of preventing aircraft from stalling. By deflecting control surfaces they prevent an aircraft from slipping at high angles of attack or angle-of-attack increase to excessive values during a slip.

There is one more way to improve the stability of an aircraft with a complex-planform wing and a variable-geometry wing at high angles of attack -- employment of vortex generators. These are measures or devices designed to create additional vortices and changes in the required direction in the velocity field around the wing, tail, and other parts of an aircraft. Similar devices in the form of projections, saw-cut slits, teeth, etc are widely used on swept wings to combat wingtip flow separation.

On a complex-planform and variable-geometry wing either a reverse-sweep cut on the inboard leading-edge extension or a projection on the leading edge, which form an additional vortex with opposite (in comparison with the principal leading-edge vortex) direction of flow rotation are used as a vortex generator. This vortex weakens the effect of the main vortex on airflow past the wing and tail (diminishes adverse wash effects) and improves an aircraft's stability at high angles of attack.

As a rule aircraft with a complex-planform and variable-geometry wing have elongated fuselage nose sections. Considerable effect on the stability characteristics of the aircraft is exerted by vortices forming on the lateral surfaces of the fuselage nose section. They are similar in nature to inboard extension leading-edge vortices, but in contrast to the latter their point of separation is not fixed. At low angles of attack fuselage vortices are practically symmetrical. At high angles of attack, however, their intensity increases and the symmetry is disrupted, even in the absence of a slip. During a slip and asymmetry thinning of flow proves different on the left and right sides, and significant destabilizing yawing moments develop. In addition, with a change in angles of attack and slip, these vortices, displacing along the surface of the fuselage, worsen flow over the wing and tail.

Lateral fins are placed on the fuselage nose section or pitot head, which act as vortex generators, to combat this phenomenon; vortices are position-fixed on the sharp edges of the fins and create an additional stabilizing yawing moment. Airflow over the wing and tail improve.

In recent years active control devices have begun to be employed on aircraft with a complex-planform wing. An aircraft's aerodynamic characteristics change in flight by the deflection of controls and high-lift devices with the aid of special automatic mechanisms. But this subject requires separate discussion.

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